Form 132026wd
3-02

Iowa Department of Transportation

Bid Response

Purchasing Section
800 Lincoln Way
Ames, IA 50010

		Date Bids Due: June 6, 2012	Time of Bid Opening: 1:00 P.M.
Proposal Number: LT00991	Commodity Description: Rockwell City Wind Turbine		Bid Opening Location: Ames, IA
Contract to Begin: June 29, 2012	Date of Completion: September 28, 2012	Proposal Guaranty Amount: $6,500.00	Liquidated Damages:

Purchasing Agent to contact for additional info.: Mary Zimmerman	e-mail: mary.zimmerman@dot.iowa.gov	Phone: 515-239-1298	Fax: 515-239-1538
Company Name:			Federal Tax ID:
Street Address:	City:	State:	Zip Code:
Individual preparing bid (type or print);	e-mail:	Phone:	Fax:

Will you sell these items/services to political subdivisions within the State of Iowa under the same prices, terms and conditions as specified? ☐ Yes ☐ No	Are you an Iowa Targeted Small Business? ☐ Yes ☐ No

GENERAL INFORMATION

This bid package includes the proposal, schedule of prices, standard terms and conditions, supplemental terms, specifications, mailing label and other information you need to prepare your bid. The pages of the document labeled “Bid response” must be typed or completed in ink, signed, and returned in a flat style envelope prior to the bid opening date and time. Please use the furnished mailing label, or indicate on your return bid by marking “Iowa Department of Transportation, proposal number & letting date” on the outside of the return envelope. The bidder may personally deliver, mail, or select a carrier that ensures timely delivery. **Faxed bids will not be accepted.**

If required, each bid must be accompanied by a proposal guaranty in an accepted form, in the sum indicated above. Refer to the Standard Terms and Conditions for the accepted forms in which the proposal guaranty requirement may be fulfilled. Bids lacking a required proposal guaranty will not be considered for award. If the contractor fails to enter into a formal contract within fifteen (15) days after award is made, the proposal guaranty may be retained by the State.

PROPOSAL STATEMENT

The entire contents of this Proposal, Addendums to the Proposal, Specifications, Supplemental Terms and Conditions, Standard Terms and Conditions, and Schedule of Prices shall become part of the contract.

We promise to enter into a contract within fifteen (15) days after award or forfeit the proposal guaranty furnished herewith.

We promise to furnish all materials, equipment and/or services specified, in the manner and the time prescribed, at prices hereinafter set out.

We certify that we have not, either directly or indirectly, entered into any agreement or participated in any collusion or otherwise taken any action in restraint of free competition; that no attempt has been made to induce any other person or firm to submit or not to submit a bid; that this bid has been independently arrived at without collusion with any other bidder, competitor, or potential competitor; and that this bid has not been knowingly disclosed prior to the opening of bids to any other bidder or competitor.

We certify that all materials, equipment and/or services proposed meet or exceed the specifications and will be supplied in accordance with the entire contents of this proposal.

We promise to complete the contract within the contract period, or pay any liquidated damages, if stipulated, for each calendar day as set forth in the bid documents.

Signed _____Date _____

Iowa Department of Transportation
Schedule of Prices
Proposal No.: LT00991
Rockwell City Wind Turbine
Letting Date: June 6, 2012 1:00 P.M.

Project Description: Rockwell City Wind Turbine located at 2770 Norridge Ave, Rockwell City, IA 50579.

Project Number:BG-9R20(003)—80-13 **County: Calhoun**

Item No.	Description	Quantity	Unit/Price	Total Bid Amount
1.	Install a grid-tied, inverter based, 20kW wind turbine and all of the electrical connections to the building, located at 2770 Norridge Ave, Rockwell City, IA 50579 in Calhoun County. according to plans and specifications.	1 Job	Lump/Sum	$_____

I hereby certify that this proposal meets or exceeds the minimum requirements including specifications and addendums.

Authorized Signature _____

Contact Person:

Company _____

_____
(Print Name)

Address _____

Federal Tax I.D. No.:_____ _____
(City) (State) (Zip Code)

Contractors Registration No.:_____ Phone No: _____

Email:_____ Fax No.: _____

I acknowledge receipt of addendum nos.:_____

Iowa Department of Transportation
PURCHASING PROPOSAL
Standard Terms and Conditions

Contents of Contract: The entire contents of this proposal shall become a part of the contract or purchase order. In case of a discrepancy between the contents of the contract documents, the following items listed by descending order shall prevail:

- Addendums
- Purchasing Proposal/Schedule of Prices
- Specifications, Plans and Drawings
- Supplemental Terms and Conditions
- Standard Terms and Conditions

For example, if there is a statement in the specifications that contradicts a statement in the Standard Terms and Conditions, the statement in the specifications shall apply.

Preparation of Proposal: All proposals must be completed in every respect and must clearly answer all questions contained in the proposal. Bids must be typed or completed in ink on the forms supplied by the department. **You must sign your bid and seal it in the envelope.** Bids must be received prior to the bid opening date and time. The bidder may personally deliver, mail, or select a carrier that ensures timely delivery

Proposal Guaranty: If required, a proposal guaranty, in the sum listed on the proposal form, can be supplied in one of the following ways: (1) A certified check or credit union certified share draft, cashier's check, or bank draft, drawn on a solvent bank or credit union, may be certified furnished with your bid. Certified checks and certified share drafts shall be drawn and endorsed in the amount indicated. Checks or drafts shall be made payable either to the Iowa Department of Transportation (Iowa DOT) or to the bidder. If payable to the bidder, the check or draft shall be endorsed, without qualifications, to the Iowa DOT by the bidder or his authorized agent. (2) An insurance or surety company may be retained to provide a bond in fulfillment of the proposal guaranty requirement. A properly completed and signed copy of the Proposal Guaranty (Form 131084) must accompany the bid. The Iowa DOT's Proposal Guaranty form must be used, no other forms or formats will be accepted.

Bid Opening: Bid Openings are public and conducted at the Ames complex unless otherwise specified. Proposals received after the time of the bid opening will be returned unopened.

Debarment and Vendor Suspension: By submitting a proposal, the contractor is certifying that it and its Principals and/or subcontractors are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by the State of Iowa or any Federal department or agency.

Communications: Questions concerning this proposal should be directed to the Purchasing Agent listed on the Purchasing Proposal. Inquiries can be written, phoned, or faxed. In all cases, written communication will take precedence over verbal communication.

Faxed bids will not be accepted.

Acceptance/Rejection: The State of Iowa reserves the right to accept or reject any or all bids and to waive irregularities or technicalities, provided such waiver does not substantially change the offer or provide a competitive advantage to any vendor, in the judgment of the Iowa DOT. The Iowa DOT also reserves the right to accept that bid which is deemed to be in the best interests of the state. Any unauthorized changes, additions, or conditional bids including any ties to another bid or proposal or any reservations about accepting an award or entering into a contract, may result in rejection of the bid. Bids must remain available for award for thirty (30) days from date of bid opening.

Method of Award: Award shall be made to the lowest responsible, responsive bidder unless otherwise specified. By virtue of statutory authority preference will be given to products and provisions grown and coal produced within the State of Iowa.

Award Protests: Protests of award recommendations are to be addressed to the Director of Purchasing, and shall be made in accordance with paragraph 761--20.4(6)"e", Iowa Administrative Code.

Bid Results & Disclosure: A bid tabulation will be sent to all responsive bidders with an award recommendation indicated. At the conclusion of the selection process, the contents of all proposals will be placed in the public domain and be open to inspection by interested parties, according to state law. Trade secrets or proprietary information that are recognized as such and are protected by law may be withheld if clearly identified as such in the proposal.

Contracts: Successful contractor(s) may be sent either a formal Contract or a Notification of Award as confirmation of acceptance and award. Contracts shall be for the term stated on the Proposal and may be extended for additional period(s) under the same terms and conditions upon mutual agreement. The contractor may not assign the contract to another party without written authorization from Iowa DOT Purchasing.

Pricing and Discount: Unit prices shown on the bid/proposal shall be quoted as the price per unit (e.g., gal., case, each, etc.) as stated on the request. If there is a discrepancy between the unit bid prices, extension, or total amount of bid, the unit prices shall prevail. Unless otherwise indicated, prices shall be firm for the duration of the contract or purchase. Discounts for early payment are allowed, but not considered in award of the contract.

Taxes: Prices quoted shall not include state or federal taxes from which the state is exempt. Exemption certificates will be furnished upon request.

Payment Terms: The Iowa DOT will normally pay properly submitted vendor invoices within thirty (30) days of receipt, providing goods and/or services have been delivered, installed or inspected (if required), and accepted. Invoices presented for payment must be only for quantities received by the Iowa DOT, must reference the purchase order number, and be submitted for processing.

Quality: All material shall be new and of first quality. Items which are used, demonstrators, refurbished, obsolete, seconds, or which have been discontinued are unacceptable without prior written approval by the Iowa DOT.

Recycled Content: The Iowa Code encourages purchase of products and materials with recycled content, including but not limited to paper products, oils, plastic products, compost materials, aggregate, solvents, and rubber products. When bidding recycled items or alternatives, note on your bid the recycled content, if known.

Infringement: Goods shall be delivered free of the rightful claim of any third party by way of infringement. Contractor shall indemnify and save harmless the State of Iowa and the Iowa DOT against all claims for infringement of, and/or royalties claimed under, patents or copyrights on materials and equipment furnished under this bid.

Default: Failure of the contractor to adhere to specified delivery schedules or to promptly replace rejected materials shall render the contractor liable for all costs in excess of the contract price when alternate procurement is necessary. This shall not be the exclusive remedy and the Iowa DOT reserves the right to pursue other remedies available to it by law or under the terms of this contract.

Ames Deliveries: Materials delivered to the Distribution Center's Receiving Section, 800 Lincoln Way, Ames, IA shall be delivered between the hours of 7:30 a.m. and 3:30 p.m. on any day except Saturday, Sunday, or a holiday. For deliveries to locations other than the Distribution Center, the contractor may wish to contact the destination location for available times to deliver, as some Iowa DOT offices and locations work a non-standard work week.

Delivery: Deliveries shall be F.O.B. destination unless otherwise specified. All deliveries shall be accompanied by a packing slip indicated the vendor, quantities shipped, and the purchase order number(s). All delivery charges shall be included in the bid price and paid by the contractor. No collect or C.O.D. deliveries will be accepted. When entering into a contract, the contractor shall notify the freight company that all freight and delivery charges are to be prepaid by the contractor. The Iowa DOT will not be liable for any freight claims or unpaid freight bills arising from this contract.

Applicable Law: The contract shall be governed under the laws of the State of Iowa. The contractor shall at all times comply with and observe all federal and state laws, local laws, ordinances, and regulations which are in effect during the period of this contract and which in any manner affect the work or its conduct. Any legal action relating to the contract shall only be commenced in the Story County, Iowa, District Court or the United States District Court for the Southern District of Iowa.

Administrative Rules: For Additional details on the rules governing the actions of the Iowa DOT Purchasing Section, refer to 761 IAC, Chapter 20, Iowa Administrative Code, entitled "Procurement of Equipment, Materials, Supplies and Services".

Equal Opportunity: Firms submitting bids must be an "Equal Opportunity Employer" as defined in the Civil Rights Act of 1964 and in Iowa Executive Order Number Thirty-four.

Affirmative Action: The contractor (and also subcontractor, vendor, or supplier) is prohibited from engaging in discriminatory employment practices forbidden by federal and state law, executive orders and rules of the Iowa Department of Management, pertaining to equal employment opportunity and affirmative action. Contractor may be required to have on file a copy of their affirmative action program, containing goal and time specifications. Contractors doing business with Iowa in excess of $5,000 annually and employing 50 or more full time employees may be required to file with the Iowa Department of Management a copy of their affirmative action plan. Failure to fulfill these non-discrimination requirements may cause the contract to be canceled and the contractor declared ineligible for future state contracts or subject to other sanctions as provided by law or rule.

Targeted Small Businesses: The Iowa DOT seeks to provide opportunities for women and/or minority small business enterprises. To apply for certification as an Iowa Targeted Small Business, contact the Iowa Department of Inspection and Appeals (515-281-5796). Contractors shall take documented steps to encourage participation from Targeted Small Businesses for the purpose of subcontracting and supplying of materials.

Interest in Contract: No state or county official or employee, elective or appointive shall be directly or indirectly interested in any contract issued by the Iowa DOT, See Code of Iowa 314.2.

Records Audit: The contractor agrees that the Auditor of the State of Iowa or any authorized representative of the state, and where federal funds are involved, the Comptroller General of the U.S. Government, shall have access to and the right to examine, audit, excerpt, and transcribe any directly pertinent books, documents, papers, and records of the contractor relating to orders, invoices, or payments of this contract.

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Iowa Department of Transportation
General Requirements
Proposal No.: LT00991
Rockwell City Wind Turbine
Letting Date: June 6, 2012 1:00 P.M.

Part 1 General Conditions

1.1 Adoption of General Conditions

A. The General Requirements of this Contract shall include the "General Conditions", "Instructions to Bidders" and the "Supplementary General Conditions" as herein stated.

B. "THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION", A.I.A. FORM #A-201, LATEST EDITION AND A.I.A. DOCUMENT, "INSTRUCTIONS TO BIDDERS", FORM #A-701, LATEST EDITION, SHALL BE INCLUDED, AS MODIFIED IN THE "SUPPLEMENTARY INSTRUCTIONS TO BIDDERS" AND "SUPPLEMENTARY GENERAL CONDITIONS", AND BOUND WITH THE STANDARD FORM OF AGREEMENT BETWEEN THE CONTRACTOR AND OWNER", A.I.A. FORM #101, LATEST EDITION, AS A PART OF THIS CONTRACT SPECIFICATION.

C. All bidder information and conditions, bid check lists and similar documents included in the specification by the Office of Purchasing and Distribution of the Iowa Department of Transportation, Ames, Iowa are hereby made a part of the General Conditions.

Part 2 Supplementary Instructions to Bidders

2.1 General

A. Owner:
The Owner of this project is the Iowa Department of Transportation, 800 Lincoln Way, Ames, Iowa 50010.

Project Location:
Iowa Department of Transportation
Rockwell City Maintenance Garage
2770 Norridge Ave.
Rockwell City, IA 50579

B. Contract Document Information:

Contact persons regarding project site visit contact:
Iowa Department of Transportation
Scott Gustafson Phone number, 515-239-1443
Email: scott.gustafson@dot.iowa.gov

Questions regarding the bidding documents should be directed to:
Purchasing Section
Purchasing Agent – Mary Zimmerman
Phone No.: 515-239-1298 Fax No.: 515-239-1538
Email: mary.zimmerman@dot.iowa.gov
Email requests for a plan holders list for this project.

C. Restrictions on Communication

From the issue date of this RFP until announcement of the successful Vendor, Vendors may contact only the Issuing Officer. The Issuing Officer will respond only to questions regarding the procurement process. Questions related to the interpretation of this RFP must be submitted in writing to the Issuing Officer by 1:00 p.m**., May 30, 2012.** Verbal questions related to the interpretation of this RFP will not be accepted. Vendors may be disqualified if they contact any state employee other than the issuing officer.

In NO CASE shall verbal communication override written communication. Only written communications are binding on the State.

The Iowa DOT assumes no responsibility for representations concerning conditions made by its officers or employees prior to the execution of a contract, unless such representations are specifically incorporated into this RFP. Verbal discussions pertaining to modifications or clarifications of this RFP shall not be considered part of the RFP unless confirmed in writing. All such requests for clarification shall be submitted in writing. Any information provided by the Vendor verbally shall not be considered part of that Vendor's proposal. Only written communications from the Vendor and received by the Iowa DOT shall be accepted.

D. Scope of Work

This project is for Contractor to provide all materials, labor, and equipment necessary to install a grid-tied, inverter based, 20kW wind turbine and all of the electrical connections to the building, located at 2770 Norridge Ave, Rockwell City, IA 50579 in Calhoun County. according to plans and specifications.

Installing the turbine consists of erecting a 70 ft. tower mounted with a 3 blade, yaw controlled, 20kW generator on a suitable structural foundation of reinforced concrete. The inverter power electronics and turbine programmable logic controller are installed in weatherproof cabinets at the base of the tower.

The main output of the inverter system is 480VAC, 3 phase power which is routed to the building main electrical room, stepped down to 208/120V and interconnected to the grid via a new circuit breaker installed in the existing Main Distribution Panel (MDP).

One 120V single phase circuit and three communication circuits are installed from building equipment to the wind turbine’s main control cabinet for maintenance power and data transfers and control.

E. Contract Award:

- Award will be based on the total lump sum amount of bid price shown on the Schedule of Prices. Bid price will include all requirements listed in Specifications, Drawings and Supplemental Terms to complete this proposed project. The Prime Contractor shall be responsible for taking all sub-bids and for all coordination between trades.

- A single "Prime" contract shall be awarded for all work shown on the Drawings and described in the Specifications including Site work, General construction, Demolition, Plumbing, Mechanical, Energy management and control and Electrical work. The Prime Contractor shall be responsible for taking all sub-bids and for all coordination between trades.

- Protests of award recommendations shall be made in accordance with Paragraph 761--20.4(6)"e", Iowa Administrative Code.

- Contractor shall return all contractual documents within fourteen (14) calendar days from date indicated in contract cover letter. ***If this is not returned within this time frame, contract may be voided and awarded to the next low bidder.***

2.2 Bidders Representatives

A. Site Visit and Pre Bid Conference

- It is **mandatory** that bidders attend a pre-bid vendor conference on May 23, 2012 at 10:00 A.M., Rockwell City Maintenance Garage in the main conference room, 702 High St., Rockwell City, IA 50579. It is a requirement for General Contractors to attend to bid the project.

- It is required that prospective bidders on this project shall visit the job site prior to submitting a quotation for this work. To view the site, contact Scott Gustafson, Phone number 515-239-1443.

- No considerations or revision in the contract price or scope of the project will be considered by the Owner for any item which could have been revealed by a thorough on-site inspection and examination.

B. Conditions of Work:

Bidders must inform themselves fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve successful bidders of their obligation to furnish all material and labor necessary to carry out the provisions of this contract. Insofar as possible, the Contractor, in carrying out the work, must employ such methods or means as will not cause any interruption of, or interference with the work of any other contractor.

C. Obligation of Bidder:

- At the time of the opening of bids, each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the drawings, specifications, and other contract documents, including all addenda.

- The failure or omission of any bidder to examine any form, instrument, or document shall in no way relieve any bidder from any obligation in respect to

their bid.

D. Codes, Laws and Regulations:

The laws of the State of Iowa in relation to and pertaining to public improvements shall apply to this project. All construction, materials and methods shall comply with the State and Local Building Codes and with Local Ordinances, except where plans and specifications establish a higher standard.

E. Licenses, Permits and Inspections

The Vendor shall give all notices and comply with all codes, laws, ordinances, rules and regulations of any public authority having jurisdiction that bears on the performance of its work. The Vendor shall pay for all licenses, permits and inspection fees required for its work. The Vendor must furnish copies of all approved inspection certificates and approvals from authorities having jurisdiction in a timely fashion upon completion of the work.

2.3 Bidding Documents

A. Plans and Specifications:

- The Plans and Specifications are to remain on file at the Iowa DOT Purchasing Office of Purchasing, 800 Lincoln Way, Ames, IA 50010. The Iowa DOT shall furnish to the Contractor all copies of Plans and Specifications reasonably necessary for the execution of the work. No deposit is required for Contract Documents.

- In the event of a conflict between the specifications and the drawings, the specifications shall take precedence.

B. Contents of the Contract Documents:

- In case of a discrepancy between contents of the contract documents, the following items listed by descending order shall prevail:

    1. Addendum
    2. Proposal Form
    3. Special Provision
    4. Plans
    5. Supplemental Specifications
    6. Standard Specifications

  Should there be a discrepancy between figures and drawings on any of the contract documents, the figures shall govern unless they are obviously incorrect.

C. Interpretation of Contract Documents:

- If any person contemplating submitting a bid for the proposed contract is in doubt as to the true meaning of any part of the Plans, Specifications or other proposed contract documents, the bidder will submit to the Iowa DOT a written request for an interpretation thereof. Requests for interpretation must be received on or before **1:00 P.M.**, **May 30, 2012.**

- The person submitting a request will be responsible for its prompt delivery.

- No interpretation of the meaning of the drawings, specifications, or other pre-bid documents will be made to any bidder orally. Interpretations will be made only by addendum duly issued.

- A copy of such addendum will be mailed or delivered to each person receiving a copy of the contract documents and to such other prospective bidders having requested that they be furnished with a copy of each addendum.

D. Materials and Equipment:

- Names of Manufacturers and vendors listed in the bidding documents are listed for the bidders only. Manufacturers and vendors, in addition to those specifically listed, are acceptable when it is proven to the satisfaction of the Iowa DOT that:

    a. The level of quality proposed is equal to or better than that of the referenced manufacturer/vendor's quality.

    b. The technical characteristics of the proposed product meet or exceed the requirements of the drawings and specifications.
    c. The use of the materials or equipment does not require major revisions of the drawings and specifications to permit their use.

- Any additional cost in other work incurred as a result of these approvals shall be borne by the Contractor, including all costs for modifying other related materials/systems and the cost of any additional engineering or design fees required to accommodate the substitution/approval.

- The Contractor must be confident that a proposed product or material meets or exceeds the requirements shown on the drawings and specifications. It will be the responsibility of the Contractor to verify and demonstrate that a proposed product meets or exceed the drawings and specifications at time of shop drawing reviews. If a proposed product or material is determined to be technically unacceptable as judged by the Iowa DOT, the Contractor shall be required to supply products or materials that meet the requirements required to supply products or materials that meet the requirements stated in the drawings and specifications at no cost increase to the Iowa DOT. Under no circumstances will the Iowa DOT be required to prove that proposed substitutions is not equal to the project requirements. The decision of the Iowa DOT on all requested proposals/substitutions is final.

E. Exceptions/Equals:

No substitutions, changes or additions to the request for proposals shall be permitted unless a written request for a substitution, change or addition is submitted to the department's purchasing office **by May 30, 2012 @ 1:00 P.M.** to allow an analysis and response to all bidders, and the substitution, change or addition is approved by the purchasing office. **All submittals must be in writing**.

F. Addenda:

- Addenda, if issued, will be mailed to all known plan holders, and acknowledgement of receipt of addenda will be indicated on the bidder's proposal form.

- All addenda so issued shall become part of the contract documents.

2.4 Bidding Procedures

A. Proposed Form:

- Each proposal must be submitted in ink or typewritten and shall be sealed in the envelope provided in the packet.

- Submit bids to The Iowa Department of Transportation, Purchasing Section, 800 Lincoln Way, Ames, Iowa 50010. Bids shall be due on or before **1:00 P.M., June 6, 2012,** and shall be read publicly thereafter.

- Each Bid must be submitted on the Schedule of Prices form included in the packet.

- All bids received by the Iowa DOT, which require allocation of appropriated state funds, are subject to the acceptance of the issuing department of the State of Iowa.

B. Proposal Guaranty:

Each bid must be supported by a Proposal Guaranty in the sum of **$6,500.00.** The proposal guaranty shall be in the form of a certified check or credit union certified share draft, cashier's check, or bank draft drawn on a solvent bank or credit union. Certified checks or credit union certified share drafts shall bear an endorsement signed by a responsible official of such bank or credit union as to the amount certified. Cashier's checks or bank drafts shall be made payable either to the Contracting Authority or to the bidder and, where made payable to the bidder, shall contain an unqualified endorsement to the Contracting Authority signed by the bidder or his authorized agent.

Certified checks and credit union share drafts shall be certified, or the cashier's check shall be drawn and endorsed, in an amount not less than prescribed in the proposal. Bid bond may be used for the proposal guaranty in lieu of that specified above. ***A bid bond must be submitted on Iowa Department of Transportation Form No. 131084 included in the packet or bid will be rejected.***

The proposal guaranty of the qualified responsive low bidder will be retained until a contract is entered into and the required Bonds and Insurance Certificates filed. All other bid securities will be returned after the award has been made.

C. Withdrawal Period:

Prime bidders, subcontractors and material suppliers on this project agree to guarantee their proposal for a period of thirty (30) days after the date of receipt of bids. No bid may be withdrawn during this period.

D. Extension of Contract Period:

The Iowa DOT will grant an extension of the contract period for additional work requiring additional construction time that adds additional work to the controlling item of work.

E. Liquidated Damages:

- Time is an essential of the contract, and it is important that the work be pressed vigorously to completion. The cost per day for liquidated damages is indicated on the Purchasing Proposal form.

- For each calendar day that any work shall remain uncompleted beyond the completion date or any extension granted under Extension of Contract Period, the amount per calendar day specified in the proposal form will be assessed, not as a penalty but as predetermined and agreed upon liquidated damages. If work remains uncompleted on more than one portion for which calendar days and liquidated damages have been specified, the liquidated damages assessed will be the total of the damages per day listed for each uncompleted portion.

  The Owner shall prepare and forward to the Contractor an invoice or credit change order for such liquidated damages. The final payment shall be withheld until payment of the invoice has been made or the credit change order has been agreed upon.

- Assessment of liquidated damages will be based only on the number of calendar days required to complete the contract beyond the contract completion date, plus authorized extensions.

- The provision for the assessment of liquidated damages for failure to complete work within the contract period does not constitute a waiver of the Owner's right to collect any additional damages other than time delays, which the Owner may sustain by the failure of the Contractor to carry out the terms of the contract.

F. Facsimile Modifications and Bid Closing:

- Bids received prior to the time of opening will be securely kept, unopened. The officer whose duty it is to open them will decide when the specified time has arrived, and no bid received thereafter will be considered.

- Modification of the bid price by facsimile of bids already submitted will be considered if received prior to the time set for the opening. The changes shall not reveal the bid price but shall provide the amount to add or subtract to modify the bid so the total amount is not known until the bid is opened.

G. Informalities:

The Owner may waive any informalities or reject any or all bids.

2.5 Consideration of Bids

A. Rejection of Bids:

- The Iowa DOT reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Iowa DOT that such bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein.

- Conditional bids will not be accepted.

B. Qualification of Bidder:

The Iowa DOT may make such investigations as they deem necessary to determine the ability of the bidder to perform the required work, and the bidder shall furnish to the Iowa DOT all such information and data for this purpose as the Iowa DOT may request.

2.6 Performance and Payment Bonds

A. Bonds:

Performance bond is not required on contracts for less than $25,000. However, if the Contract is $25,000 or more, the bidder shall furnish bonds covering the faithful performance of 100% of the Contract and the payment of all obligations arising thereunder. One copy of the bond shall be submitted on Iowa Department of Transportation Form 131070. All items must be properly filled in, including Contractor's signature. Resident commission agent or attorney-in-fact must file a copy of the power of attorney.

B. Power of Attorney:

Attorney-in-fact who signs the proposal guaranty, Performance Bond, and Labor and Material Payment Bond must file with each bond a certified and effectively dated copy of the Power of Attorney.

2.7 Notice of Tax Exempt Status

A Sales Tax Exemption Certificate and authorization letter will be issued to the successfully awarded construction contractor for the purchase of building materials, supplies and equipment used in the performance of this construction contract.

The Department of Transportation is exempt from paying sales and use taxes. ***Do not include sales tax in your bid for this project.***

2.8 Labor Regulations

All contractors, before entering into a contract with the Department, must be registered with the Division of Labor in the Iowa Department of Workforce Development (515-281-3606) according to chapter 91C, Code of Iowa 2003.

2.9 Targeted Small Business Program

The 1986 Iowa Legislature enacted legislation relating to procurement from Iowa Targeted Small Businesses. (Iowa Code, Chapter 73. And Iowa Administrative Code rules 820--[01,B] Chapter 2). It is hereby agreed that when entering into a contract with the State of Iowa, the vendor/contractor will take documented steps to encourage participation from TSB's for the purpose of subcontracting and supplying of materials.

A list of Targeted Small Business Contractors is available on the Internet at https://dia.iowa.gov/tsb and click on Search Targeted Small Businesses.

Part 3 Supplementary General Conditions

3.1 The Contractor

A. Guidelines:

- Contractors shall comply with Iowa Occupational Safety and Health Standards as found in 29 CFR Parts 1910 and 1926. Of particular importance are those standards referring to the use of personal protective equipment, fall protection and ventilation.

- Contractor may be required to make available to Iowa DOT at time the apparent low bidder has been determined all Material Safety Data Sheets (MSDS) for all products provided prior to approved contractor and award. These must be faxed to Purchasing 515-239-1538 with cover indicating project the MSDS sheets pertain to. This shall be faxed within two (2) days upon request.

B. Guarantee:

The Contractor shall guarantee all work executed under this contract, both as the workmanship and materials, for a period of twelve (12) months after the date of acceptance, except that special guarantee provision specified elsewhere in these Specifications shall take precedence. Neither the final payment nor any provision of the contract documents shall relieve the Contractor of responsibility for faulty materials or workmanship. The Contractor shall remedy any defect thereto and pay for any damage to other work resulting therefrom, which shall appear within a period of one (1) year from the date of the final acceptance. With one month remaining in the guarantee period, the Contractor shall notify the Iowa DOT and set up a complete building walk-through inspection.

- All materials, items of equipment, and workmanship furnished under this division of the specifications shall carry the standard warranty against all defects in material and workmanship. Any fault due to defective or improper material, equipment, or workmanship which may develop, shall be made good, forthwith.

- The Guarantee shall include, but not be limited to the following elements and services:
    a. Repair or replace defective materials, equipment, workmanship and installation that develops within the guarantee period, promptly and to Iowa DOT's satisfaction and correct damage caused in making necessary repairs and replacements, including all other damage done to areas, materials, and other systems resulting from the failure or defect, under guarantee by and at the expense of the Contractor.
    b. Replace material or equipment that requires excessive service during guarantee period, as defined and as directed by the Iowa DOT.
    c. Make all service calls, replacements, repairs and adjustments during the guarantee period without cost to the Iowa DOT.

C. Workmanship

Work shall be performed in best, most workmanlike manner by mechanics, skilled and employed continuously in their respective trade. Installation shall be made by the manufacturer or their authorized installer where specified. Unsatisfactory work

shall be replaced at Contractor's expense.

D. Shop Drawings and Samples:

- Shop drawings, specification data, and samples shall be submitted to the Iowa DOT for approval and/or selection prior to the placing of orders for any equipment and materials.

- Shop Drawings: Shop drawings shall be submitted after the schedule of proposed material and equipment has been approved. Submit details of systems and equipment to the Iowa DOT for review. Submit a minimum of eight binders

  containing one copy each of Shop Drawing of all systems and equipment as indicated in each Division of the specifications: (Note: Submission of Shop Drawings not in binders, but in loose sheet form, may be considered cause for rejection with resubmission in proper form required).

- Product Data: Submit manufacturer's product data to the Iowa DOT for approval, consisting of complete specifications, test report data, installation instructions, and other pertinent technical data required to complete product.

  a. Intent of Shop Drawings and Product Data review is to check for capacity, rating and certain construction features. Ensure that work meets requirements of Contract Documents regarding information that pertains to fabrication processes or means, methods, techniques, sequences and procedures of construction, and for coordination of work of this and other Sections.

  b. Perform work in accordance with submittals marked "No Exception Taken" to extent that they agree with Contract Documents. Submittal review shall not diminish responsibility under this Contract for dimensional coordination, quantities, installation, wiring, supports, access, service and errors, nor for deviations from requirements of Contract Documents. Requirements of Contract Documents are not limited, waived, nor superseded by Shop Drawing Review.

  c Submittals of various systems shall indicate equipment supplier used and that all equipment of particular system is being furnished by same supplier. Supplier shall be qualified to supervise installation, connection and testing of system and have competent maintenance service for respective systems.

  d. Shop Drawings and samples will be reviewed with reasonable promptness and will be stamped indicating appropriate action as follows:

     1) **"No Exception Taken"** means that fabrication, manufacture, or construction may proceed providing submittal complies with Contract Documents.

     2) **"Make Corrections Noted"** means that fabrication, manufacture, or construction may proceed providing submittal complies with Engineer's notation and Contract Documents. If, for any reason, notations cannot be complied with, resubmit as described for submittals stamped **"Reject".**

     3) **"Revise and Resubmit"** means submittal information is incomplete or ambiguous and therefore clarification or additional information is required to ascertain compliance with

the contract documents, and that fabrication, manufacture or construction shall not proceed. Provide additional data required by the contract documents and resubmit.

4) **"Reject"** means that submittal does not comply with Contract Documents and that fabrication, manufacture, or construction shall not proceed. Resubmit in accordance with requirements of Contract Documents.

E. Use of Premises:

- All Contractors shall confine all apparatus, storage of materials and construction to areas as directed by the Iowa DOT and shall not encumber the premises with materials.

- Notwithstanding any approvals or instructions which must be obtained by the Contractors from the Iowa DOT in connection with use of premises, the responsibility for the safe working conditions at the site shall remain that of the Contractors.

F. Cutting and Patching:

- Each Contractor shall cut holes necessary to install work.

- Similarly, each contractor shall perform all necessary patching that result from cutting of holes. The Prime Contractor shall resolve any conflict between trades, and it will be the contractor's responsibility to see all patches are made. Any and all through-wall penetration requiring structural modifications and or structural members shall be provided by the Prime Contractor.

G. Clean-Up:

Throughout the period of construction, the Contractor shall clean up all work and yard areas and keep the area reasonably free of debris, etc., as required for proper protection of the work. Prior to final acceptance, the Contractor shall remove all debris, tools and equipment from the project site.

H. Immunity of Iowa Department of Transportation

The Contractor shall defend, indemnify and hold harmless the Iowa Department of Transportation, and its officials and employees from liability arising out of or resulting from the Contractor's activities at the rest area, its performance or attempted performance of the contract, as well as the Contractor's activities with Sub-Contractors and all other third parties.

I. Suspensions and Debarment.

The Vendor certifies pursuant to 48 CFR Part 9 that neither it nor its principles are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this Contract by any federal Agency or agency. The Vendor certifies that it is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in any contracts with the State of Iowa.

J. Termination Due to Lack of Funds or Change in Law

Notwithstanding anything in this Contract to the contrary, and subject to the limitations set forth below, the Iowa DOT shall have the right to terminate this Contract without penalty and without any advance notice as a result of any of the following:

Adequate funds are not appropriated or granted to allow the Iowa DOT to operate as required and to fulfill its obligations under this Contract.

Funds are de-appropriated, reduced, not allocated, or receipt of funds is delayed, or if any funds or revenues needed by the Iowa DOT to make any payment hereunder are insufficient or unavailable for any other reason as determined by the Iowa DOT in its sole discretion; or

The Iowa DOT's authorization to conduct its business or engage in activities or operations related to the subject matter of this Contract is withdrawn or materially altered or modified; or

The Iowa DOT's duties programs or responsibilities are modified or materially altered; or

If there is a decision of any court, administrative law judge or an arbitration panel or any law, rule, regulation or order is enacted, promulgated or issued that materially or adversely affects the Agency's ability to fulfill any of its obligations under this Contract.

The Agency shall provide Vendor with written notice of termination pursuant to this section.

3.2 Administration of the Contract

A. Inspection and Supervision:

- All work shall be according to the approved design and shall be under the direct supervision of the Iowa DOT.
- Periodic site inspections will be carried on by the Iowa DOT with the contractor to ensure coordination of the project.
- The owner will provide a list of items requiring inspection prior to or during installation. The Contractor is to give the Owner notice no less than 24 hours in advance of installation.
- The Iowa DOT contact shall be: Scott Gustafson, Phone Number: 515-239-1443.

B. Contractors Construction Schedule:

The successful bidder will, within 10 days after award of contract or at the pre-construction meeting, whichever comes first, submit to the Iowa DOT, Office of Facilities Support, a detailed construction schedule including dates of commencement and completion on each phase of the proposed construction. Upon acceptance of the schedule, the Contractor will be expected to adhere to these dates as proposed.

C. Verifying Work of Other Contractors

- When a Contractor's work depends on proper execution of work by other contractors, such Contractor shall promptly report to Architect defects in such work and discrepancies between executed work and the Drawings and Specifications.

- Contractors shall employ such methods and means in carrying out work as will not cause interruption or interference with any other contractor. General Contractors shall give other contractors sufficient notice to permit installation of sleeves, piping, conduit, and other items, prior to placing concrete or laying masonry. Any Contractor failing to comply with above shall be responsible for expense caused by such failure.

3.3 Sub Contractors

- Specific attention shall be given by the Contractor to Article 5 of the A.I.A. Document A-201, "The General Conditions of the Contract for Construction".
- The apparent successful contractor for the project shall, within seven (7) calendar days after opening of the bids, furnish the Iowa DOT with a complete list of subcontractors and major material suppliers.
- The Iowa DOT shall maintain the list of subcontractors and major suppliers and issue a general approval of same after official award of the contract, subject to the specific requirements of the Plans, Specifications and the "General Conditions of the Contract, and of these supplementary Conditions," " Special Provisions," and elsewhere with contract documents, as applicable. Deviations from the list of subcontractors and material suppliers shall be made only with the specific approval of, or at the request of, the Iowa DOT.

3.4 Contract Period

- The starting and completion dates are stated on the front page of the proposal. The date of completion shall be stated in calendar days on the Contractor's proposal, and if necessary, adjusted by mutual agreement between the Iowa DOT and Contractor prior to executing the contract documents.

- The Iowa DOT realizes that deliveries and condition will have a definite bearing on the completion date. The Iowa DOT will demand diligence in the prosecution of the work, but with good cause and satisfactory past performance by the Contractor, the Iowa DOT may revise that completion date to another mutually-acceptable date, when requested in writing and in good faith by the Contractor.

3.5 Payments and Completion

A. Payments on contract will be made monthly by means of state warrants to the extent of ninety-five percent (95%) of the value of work performed, including acceptable material stored at the building site, as determined by the Engineer.

B. Immediately after signing of Contract, the Contractor shall submit schedule of values for approval on the Contract Breakdown form furnished by the Iowa Department of

Transportation. Contractor shall submit an Application for Payment on forms furnished by the Iowa Department of Transportation based on Contract Breakdown.

C. The contractor shall, before the first application, submit to the Iowa DOT a schedule of values of the various parts of the work, aggregating the total sum of the contract, made out in such form as the Iowa DOT may direct and, if required, supported by evidence as to its correctness. This schedule, when approved by the Iowa DOT, shall be used as a basis for requests for payment.

D. Final payment shall be authorized not later than thirty (30) days following the completion and final acceptance of the contract, provided that paragraph 1-3 herein and all other contract requirements have been fulfilled, accepted and approved, where no claims have been filed or following adjudication or release of claims as provided in Chapter 573 of the Code of Iowa.

E. No notification of payment being processed, no payment made to the Contractor, no partial payment, nor the entire use or occupancy of the work by the Iowa DOT shall be held to constitute an acceptance, in whole or in part, by the Iowa DOT prior to making the final payment and acceptance in full completion of the contract.

3.6 Protection of Persons and Property

A. Safety and Health Regulations:

The Contractor, serving in the role of the employer for the project, shall exercise at all times the protection of all persons and property. Contractor shall comply with all requirements of the Occupational Safety and Health Act of 1970, Iowa Bureau of Labor and all applicable state and municipal laws, as well as building and construction codes. It is the Contractor's responsibility to enforce all regulations that apply to this project.

B. Protection of Site:

The Contractor shall furnish all permanent and temporary guards, signs, fencing, shoring, and underpinning and other protection necessary in the performance of the contract and for the necessary protection of all public and private property and shall be responsible for any damage caused by failure to comply with this requirement.

- After building operations are completed, the Contractor shall replace or satisfactorily repair all damaged walks or pavements which shall have become damaged due to operations of this project.

- The Contractor shall take care of all underground pipes, conduits, etc., encountered in the excavations, and protect same from damage until such time as they can be permanently disposed of.

- The Contractor shall continuously maintain adequate protection of all work from damage and shall protect the Owner's property and adjacent property from damage arising in connection with this contract.

3.7 Insurance Requirements

Contractor's Insurance

- It shall be the Contractor's responsibility to have liability insurance covering all of the project operations incident to contract completion and the Contractor(s) must have on file with the Contracting Authority a current "Certificate of Insurance" prior to award of contract. The certificate shall identify the insurance company firm name and address, contractor firm name, policy period, type of policy, limits of coverage, and scope of work covered (single contract or statewide). This requirement shall apply with equal force, whether the work is performed by persons employed directly by the

  Contractor(s) including a subcontractor, persons employed by a subcontractor(s), or by an independent contractor(s).

- In addition to the above, the Contracting Authority shall be included as an insured party, or a separate owner's protective policy shall be filed showing the Contracting Authority as an insured party.

- The liability insurance shall be written by an insurance company (or companies) qualified to do business in Iowa. For independent contractors engaged solely in the transportation of materials, the minimum coverage provided by such insurance shall be not less than that required by Chapter 325A, Code of Iowa, for such truck operators or contract carriers as defined therein. For all other contractors, subcontractors, independent contractors, and the Contracting Authority, the minimum coverage by such insurance shall be as follows:

  - *Comprehensive General Liability* including Contractual Liability;
  - Contingent Liability; Explosion, Collapse and Underground Drainage
  - Damage; Occurrence Basis Bodily Injury: Broad Form Personal Injury; Broad Form Property Damage.

Bodily Injury

The contractor will purchase and maintain throughout the term of this contract the follow minimum limits and coverage:

- Each person $750,000
- Each accident/occurrence $750,000
- Workers Compensation $750,000
- Statutory Limits $750,000
- Employer's liability $750,000
- Occupation Disease $750,000

Operations

- Property Damage $250,000 each occurrence

Builders Risk Insurance:

- Each Contractor holding a valid contract with the Owner shall furnish and pay for builder's risk insurance, providing coverage for at least the following

losses: fire, extended coverage, vandalism and malicious damage to materials incorporated in the project, and materials purchased to be incorporated in the project, either stored on or off the permanent job site. If this insurance coverage is not provided, the Contractor shall assume all responsibility for the perils outlined above which may occur prior to project completion and acceptance.

- Failure on the part of the Contractor(s) to comply with the requirements of this Article will be considered sufficient cause to suspend the work, withhold estimates, and to deny the Contractor(s) any further contract awards, as provided in Article 1103.01.

- The Contractor(s) shall require all subcontractor(s) meet the above insurance requirements.

The Certificate of Insurance must include the following;

- Iowa Department of Transportation must be listed as an additional insured
- Proposal Number
- Proposal Description
- Letting Date and
- Contract Period

3.8 Miscellaneous Provisions

A. Iowa State Building Code:

- All construction under this section shall conform to the requirements of the Iowa State Building Code. The provisions of the Iowa State Building Code will be strictly adhered to, and will take precedence over any local Governmental Body Regulations. Work not regulated by the Iowa State Building Code shall be performed in accordance with local Governmental Body Regulations.

- All construction shall conform to the Standard Specifications for Highway and Bridge Construction, Series 2009 where applicable.

B. Discriminatory Practices:

- All contractors or subcontractors working under the terms of this project are prohibited from engaging in discriminatory employment practices as forbidden by the Iowa Civil Rights Act of 1965. These provisions shall be fully enforced, as directed through Executive Order Number 34 dated July 22, 1988. Any breach of the provisions contained in the Iowa Civil Rights Acts of 1965 shall be regarded as a material breach of contract.

- Bidder agrees that if awarded a contract to construct and/or remodel any portion of the project described in these Specifications, neither the contractor nor any subcontractors will engage in any discriminatory employment practices based on race, color, creed, religion of natural origin and that they will in all contracts comply with all statutes of the State of Iowa against discrimination. Failure to do so could be deemed a material breach of contract.

3.9 Public Contract Termination:

The provisions of Iowa Law as contained in Chapter 573A of the Code of Iowa, an Act to provide for termination of contracts for the construction of public improvements when construction or work thereon is stopped because of national emergency, shall apply to and be a part of this Contract, and shall be binding upon all parties hereto, including sub-contractors and sureties upon any bond given or filed in connection herewith.

PROJECT MANUAL

Iowa Department of Transportation
Rockwell City Wind Turbine

Iowa DOT Project No.
BG-9R20(003)—80-13

Project Address:
2770 Norridge Ave
Rockwell City, IA 50579

IOWA DOT
800 Lincoln Way
Ames, IA 50010

BROOKS BORG SKILES
ARCHITECTURE ENGINEERING LLP
317 - 6th Avenue, Suite 400
Des Moines, Iowa 50309-4108
phone: (515) 244-7167 fax:(515) 244-3813

Project 12018

WIND TURBINE
IOWA DEPARTMENT OF TRANSPORTATION

ROCKWELL CITY, IOWA

	I hereby certify that this engineering document was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa. _____, 20_____ Robert A. Hedgpeth, P.E License number: 14212 My license renewal date is December 31, 2013 Discipline ____Electrical Engineering Specification Divisions covered: _____Divisions 26 thru 31 Date issued ___May 2, 2012

BROOKS BORG SKILES
ARCHITECTURE ENGINEERING LLP
317 6th Avenue, Suite 400
Des Moines, IA 50309-4108

WIND TURBINE
IOWA DOT

ROCKWELL CITY, IA

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END OF TABLE OF CONTENTS

WIND TURBINE
IOWA DEPARTMENT OF TRANSPORTATION

ROCKWELL CITY, IOWA

LIST OF DRAWINGS

DRAWING NUMBER	TITLE
G-100	TITLE SHEET
E-100	ELECTRICAL SITE PLAN
E-101	ELECTRICAL FLOOR PLAN
E-501	ELECTRICAL DETAILS AND DIAGRAMS

ALL DRAWINGS DATED: MAY 2, 2012

SECTION 01 1000

SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Wind Turbine, Iowa Department of Transportation, Rockwell City, Iowa.

B. Owner Project Number:

C. Brooks Borg Skiles's Name: Brooks Borg Skiles, Architecture and Engineering LLP (referred to in the Specification as Architect or Architect/Engineer).

D. The Project consists of the installation of a 20kW wind turbine and electrical connections to the existing building including:
   1. 20kW wind turbine and control equipment.
   2. Concrete foundation for wind turbine.
   3. Underground conduits for power and control wiring.
   4. Adding new dry-type transformers, safety switches, conduit and wiring.
   5. Other related work including finishes.

1.02 DESCRIPTION OF ALTERATIONS WORK

A. Electrical Power: Alter existing system and add new construction, keeping existing in operation.

B. Data: Alter existing system and add new construction, keeping existing in operation.

1.03 CONTRACTOR USE OF SITE AND PREMISES

A. Owner will occupy the facility during the construction.

B. Work Hours:
   1. Normal work hours, or occupied period, are Monday through Friday, 7:00 AM to 5:30 PM (depending on the area).

C. Protection:
   1. The Owner's employees will not be relocated. During the Contractor work perior, provide temporary protection of the work areas Contractor shall strive to minimize work in areas occupied by Owner personnel.
   2. At the end of each work period and prior to Owner occupied period, the Contractor shall provide complete cleaning of the area such that it is free from debris, dust, etc.
   3. See Sections 01 14 00 - General Requirements and 02 41 00 - Selective Demolition for additional requirements.

D. Provide access to and from the building and site as required by law and by Iowa Department of Transportation:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered. Obtain permits and conform to requirements of the Fire Marshal.
   2. Do not obstruct roadways, sidewalks, or other public ways without Owner permission.

E. See Section 01 14 00 - General Requirements for usage of parking and storage spaces.

F. Utility Outages and Shutdown:
   1. Limit disruption of utility services to hours the building is unoccupied.
   2. Do not disrupt or shut down life safety systems, including but not limited to fire alarm system, without 7 days notice to Iowa Department of Transportation and authorities having jurisdiction.
   3. Prevent accidental disruption of utility services to other facilities.

1.04 SPECIAL WORK RESTRICTIONS

A. The Owner, has a responsibility to protect the public by a maintaining a secure environment. Contractor and subcontractor employees shall keep this in mind while working in and around the building. Even if a rule seems trivial it shall be followed to the letter.

B. The Contractor and subcontractors shall provide the Owner's representative with a list of all personnel that will be assigned to work on the interior of the building. The information for each worker shall include the first, middle and last names and date of birth, and may include a waiver signed by each employee acknowledging performance of the background check.
   1. Each of Contractor's and subcontractors' personnel listed maybe required to undergo a background check prior to entering the job site. The Contractor shall contact the Owner's representative to verify the security clearance prior to any personnel entering the site.

C. No drugs, alcohol, or firearms are allowed on the work site.

D. Do not leave money, drugs, alcohol, or firearms in personal vehicles.

END OF SECTION

SECTION 01 1400

GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

1.2 Schedule Of Values

1.3 Applications For Payment

1.4 Change Procedures

1.5 Coordination

1.6 Unanticipated Utility Lines

1.7 Demolition, Cutting And Patching And Alterations

1.8 Conferences

1.9 Progress Meetings

1.10 Submittal Procedures

1.11 Submittals For Review

1.12 Construction Schedules

1.13 Quality Assurance/Control

1.14 References

1.15 Inspections, Sampling, And Tests

1.16 Manufacturers' Field Services And Reports

1.17 Security

1.18 Temporary Facilities and Controls

1.19 Parking

1.20 Progress Cleaning

1.21 Products

1.22 Transportation, Handling, Storage And Protection

1.23 Product Options

1.24 Substitutions

1.25 Anchoring to New and Existing Construction

1.26 Demonstration And Instructions

1.27 Project Record Documents

1.28 Final Cleaning

1.29 Operation And Maintenance Data

1.30 Extended Warranties

1.31 Maintenance Materials

1.32 Contract Closeout Procedures

1.02 SCHEDULE OF VALUES

A. Submit schedule on AIA Form G703 or in a computer generated printout which follows the format used in the AIA Form G703. Form must be typed.

B. Submit two copies of the Schedule of Values for review within 15 days after date of Owner-Contractor Agreement established in Notice to Proceed but in no case later than one week before the first request for payment.

C. Schedule of Values must be approved before first request for payment can be reviewed.

D. Update Schedule of Values at each submission of request for payment by indicating modifications in individual items and additions or subtractions made through Change Orders (COs) or Construction Change Directives (CCDs). Place COs and CCDs at the end of the Schedule of Values.

1.03 APPLICATIONS FOR PAYMENT

A. Submit three copies of each application on AIA Form G702, according to the requirements found in AIA Document A201 - General Conditions of the Contract.

B. Content and Format:
   1. Utilize Schedule of Values to organize items listed in Application for Payment.
   2. CCDs may be included in the request for payment once they have been signed by all parties.
   3. COs may be included in the request for payment once they have been signed by all parties. When a CO is added which contains previously authorized CCDs, the CCDs included in the CO must be removed from the Schedule of Values or listed as a sub-item to the CO.

C. Payment Period: Monthly.

1.04 CHANGE PROCEDURES

A. The Architect/Engineer may initiate Instructions to Contractor (ITC) describing clarifications or modifications to the Contract Documents. If the Contractor believes a modification requires additional fee or time, Contractor shall prepare and submit a price quotation. Proposals by the Contractor shall include all related items including modifications to other Work resulting from the proposed change. If Contactor does not indicate that a change in cost or time is required within 14 calendars after receiving an ITC, it shall indicate that the Contractor accepts that change as no cost / no time change.

B. The Contractor may propose a change by submitting a request for change to the Architect/Engineer, describing the proposed change and its full effect on the Work, with a statement of the reason for the change, and the effect on the Contract Sum Price and Contract Time with full documentation, and a statement of the effect on the rest of the Work.

C. Contractor's proposals (in response to a request for proposal or when initiated by him/her) shall be accompanied by a draft AIA Form G701 with all information filled out by the Contractor.

D. Construction Change Directive (CCD) may be issued by the Architect/Engineer, based on agreement of all parties, when it is important that work proceed on an item of work before a Change Order can be fully processed.

E. Final Change Order package will be prepared by the Architect/Engineer and submitted to the Owner and Contractor for review and approval.

1.05 COORDINATION

A. Coordinate scheduling, submittals, and Work of the various Sections of the Project Manual and as described on the Drawings to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Coordinate work of all subcontractors and sub-subcontractors.

1.06 UNANTICIPATED UTILITY LINES

A. Should utility lines be encountered that are not indicated, advise Owner immediately.

B. Rectify damage to or repair accidentally damaged or broken utility lines immediately under direction of Owner.

1.07 DEMOLITION, CUTTING AND PATCHING AND ALTERATIONS

A. See Sections 01 73 29 - Cutting and Patching and 02 41 00 - Selective Demolition.

1.08 CONFERENCES

A. Architect/Engineer will schedule a preconstruction site mobilization conference after Notice of Award for all affected parties.

B. If required to verify or resolve issues arising during the construction, convene a conference at project site of all parties involved. Record minutes and distribute to all parties including the Owner and A/E.

1.09 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum two-week intervals.

B. Preside at meetings, record minutes, and distribute copies within two days to those affected by decisions made.

1.10 SUBMITTAL PROCEDURES

A. Transmit each submittal with a transmittal indicating, Project Name, DOTProject Number, BBASE Project Number, Product Name, Submittal Number (as noted below).
   1. Provide separate transmittal for each product or group of related products that are to be reviewed as a group.

B. Number the submittal forms with CSI MasterFormat 04 Section Number followed by a Submittals Number (e.g. 08 71 00.1, 08 71 00.2, 08 21 00.1.) For resubmittals, use the original number with a sequential alphabetic suffix (e.g. 08 71 00.1-A, 08 71 00.1-B.) If it is not clear what number should be used for given item, request direction from the Architect.

C. Identify Project, Contractor, subcontractor or supplier. Identify pertinent Drawing sheet and detail number(s), and Specification Section number, as appropriate.

D. Apply Contractor's stamp, signed (not initialed), certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information, is in accordance with requirements of the Work and Contract Documents.

E. Schedule submittals to expedite the Project, and deliver to Architect/Engineer, with copy of transmittals to the Owner. Coordinate submission of related items.

F. Clearly mark what part of the submitted documents are to be reviewed. If submitted product data contains multiple products and there is no indication of which are to be used on the project, the Architect reserves the right to return the submittal without review.

G. Identify variations from Contract Documents and product or system limitations that may impact the completed Work.

H. Submittals for Review:
   1. Architect/Engineer review is for general conformance with design concept and Contract Documents. Markings or comments shall not be construed as releasing Contractor from compliance with Contract Documents. Contractor is responsible for details and accuracy, for confirming and correlating quantities and dimensions, for selection of fabrication processes, for technique of assembly, and for performing work in a safe manner.
   2. Procedure:
      a. After Architect/Engineer review of submittal, at least one returned copy will have required corrections marked or be accompanied by a comment sheet.
      b. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with comments and indications.
      c. Revise and resubmit as required, identifying changes made since previous submittal. Clearly identify any unrequested changes on all submittals and resubmittals.
      d. Submittal review marking and response (See sample Submittal Review/Comment Form at the end of this Section):
         1) Submittals marked “NO EXCEPTIONS TAKEN” shall be considered reviewed and approved in accordance with the requirements of General Conditions. Resubmittal is not necessary.
         2) Submittals marked with a combination of “NOTE MARKINGS” and “CONTRACTOR CONFIRM” have been reviewed and are considered approved as noted. Resubmittal is not necessary. These Submittals may be used for fabrication or procurement but may not be used for installation or erection until Contractor submits written confirmation of acceptance of “noted” directives. Such written confirmation will be considered an attachment to the existing Submittal Number granting it an approval status in accordance with the requirements of General Conditions.
         3) Submittals marked with a combination of “NOTE MARKINGS” and “REVISE AND RESUBMIT” have been reviewed and are considered not approved and subject to notes and markings indicating required revisions. The extent of information to be resubmitted will be specified in the attached notes. The Contractor shall process returned reviewed submittals marked “REVISE AND RESUBMIT” and shall resubmit requested information in accordance with the requirements of General Conditions until an approval rating is achieved as indicated in Subparagraphs 1) or 2) above.

I. Submittals for Information:
   1. Architect/Engineer reserves right to not respond to informational submittals.
   2. Architect/Engineer will forward informational submittals, unstamped and unmarked, to Owner, without comment.

1.11 SUBMITTALS FOR REVIEW

A. Schedule of Submittals including all proposed products shall be prepared by the Contractor and submitted in duplicate within 15 days after date of Owner-Contractor Agreement Notice to Proceed. Submit complete list of major Products proposed for use, with name of manufacturer, trade name, and model number of each Product and include date when submittal will be made to the Architect/Engineer and date when response is needed on each item. Allow minimum 2 weeks for responses.

B. Maintain Schedule of Submittals showing status of each item. Make available at each Progress Meeting.

C. Shop Drawings, Product Data, and Samples:
   1. Submit the number of copies required by Contractor plus two. One copy will be retained by the Architect and one will be retained for the Owner. All other copies will be returned to the Contractor with corrections indicated.
   2. If agreed to by all parties at the preconstruction conference, a single electronic copy may be accepted in lieu of the number of hard copy submittals indicated above. In such case, one electronic copy will be returned to the Contractor.

1.12 CONSTRUCTION SCHEDULES

A. Submit an initial Draft Construction Schedule at least 3 days before the Pre-Construction Conference. Submit copies to the Owner and to the Architect/Engineer.

B. At the Pre-Construction Conference the Owner and Contractor will discuss scheduling differences and develop a revised Initial Construction Schedule.

C. Within 5 days after the Pre-Construction Conference, the Contractor shall submit a revised Initial Construction Schedule. All major subcontractors shall sign the revised Construction Schedule indicating agreement therewith. Submit copies to the Owner and to the Architect/Engineer.

D. Construction Schedule shall be in the form of a bar graph (Gantt Chart) and shall be computer generated. Each task shall include start date, end date and number of days. Required relationships to other tasks shall be shown. Tasks greater than 2 weeks shall be subdivided into smaller tasks.

E. Maintain construction schedule and provide revised schedules at Progress Meetings as needed to maintained Owner and Architect informed as to progress.

1.13 QUALITY ASSURANCE/CONTROL

A. Monitor material suppliers', fabricators', and subcontractors' quality control and workmanship to ensure work of specified quality.

B. Comply fully with manufacturer's instructions and Contract Documents. Should instructions conflict with Contract Documents or deviate from good construction practice, request clarification from Architect/Engineer before proceeding.

C. Comply with specified standards as a minimum quality for the Work. When more than one specified requirement applies or when additional codes apply, the Contractor shall comply with higher standard of those that are applicable.

D. Secure products in place with positive anchorage devices designed and sized to withstand foreseeable stresses and vibration without physical distortion or disfigurement.

1.14 REFERENCES

A. Conform to referenced standard by date of issue current as of date of Contract Documents, except when a specific date is specified or established by applicable code or stated in these Contract Documents.

B. Should specified reference standard conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

C. The Contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.15 INSPECTIONS, SAMPLING, AND TESTS

A. The Owner reserves the right to employ a testing agency to test any part of the construction.

B. Coordinate with the Owner's testing agency for inspections, sampling, and tests as indicated in

Contract Documents.

C. Provide all data required by the testing agency (including mixes to be used) in a timely manner.

D. Notify Architect/Engineer, Owner and the Owner's testing agency at least 24 hours before the need for testing.

E. Cooperate with Owner's testing agency as necessary for performance of their work including providing access and manpower for obtaining of samples and inspection of the Work.

F. Within 24 hours after completion of inspection or test, submit report to Architect/Engineer and Owner, indicating observations and results of tests.

1.16 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual Specification Sections or on the Drawings, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions and to initiate instructions when necessary.

B. Report observations and site decisions or instructions that are supplementary or contrary to manufacturers' published recommendations.

1.17 SECURITY

A. Take measures to protect Work and existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

B. Conform to Owner's safety and security requirements.

1.18 TEMPORARY FACILITIES AND CONTROLS

A. Provide for temporary utilities as required for execution of Work except as noted below.
   1. Contractor may use existing building electrical outlets.
   2. Coordinate with Owner to obtain water for construction use.

B. Provide additional temporary lighting if required to execute Work.

C. Contractor may use existing building sanitary facilities. Coordinate with Owner and maintain all facilities used in a clean condition.

D. Provide for storage and security of tools and materials delivered to the site but not yet installed.
   1. Coordinate all usage of the site with the Owner's representative, including scheduling all deliveries.

E. Barriers
   1. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
   2. Provide protection barriers as required to protect building occupants and users from construction operations.
   3. Protect vehicules, stored materials, site, and structures from damage.
   4. Coordinate location, installation and removal of barriers with Owner.

1.19 PARKING

A. Coordinate with Owner for spaces to be made available to Contractor on site.

1.20 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Clean all areas for which the Contractor is responsible on a daily basis.

C. Areas outside primary construction area, which become dirtied by construction operations, must be cleaned immediately.

1.21 PRODUCTS

A. Definitions:
   1. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the Work. Products may also include existing materials or components authorized for reuse.
   2. Furnish: To supply and deliver, unload, inspect for damage (same as supply).
   3. Install: To unpack, assemble, erect, apply, place, connect, finish, cure, protect, clean, and ready for use.
   4. Provide: To furnish or supply, plus install.
   5. Supply: To supply and deliver, unload, inspect for damage (same as furnish).

B. Do not use materials and equipment removed from existing premises, except as specifically identified or allowed by the Contract Documents or as authorized in writing by the Owner.

C. Use interchangeable components of the same manufacturer for similar components.

1.22 TRANSPORTATION, HANDLING, STORAGE AND PROTECTION

A. Transport, handle, store and protect Products in accordance with manufacturer's instructions and generally accepted construction practice.

B. Contractor is responsible for protection of stored and installed materials from moisture and mold resulting from failure to control moisture, including humidity levels.

C. Materials or products which arrive at the site wet or with a moisture content above that designated in the Specification and which have no indication of mold shall be dried out or dried to recommended moisture content level by quickest possible means which will not damage the product or material.

D. Materials or product which arrive at the with mold present shall be removed from the site immediately.

1.23 PRODUCT OPTIONS

A. Products Specified by Referenced Standards or by Description Only: Any Product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options allowed. No substitutions allowed after Bid period, except under conditions specified herein.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a pre-bid request for substitution within time limits established in Instructions to Bidders for any manufacturer not named. Lists of manufacturers beginning with "Acceptable manufacturers include:" shall be considered to permit substitutions.

D. "Similar To" or "Equal To" indicate an example product that meets specifications. "Basis of Design" indicates applicable characteristics of named product were used to design systems. In either case Contractor may propose any product that has the same or similar characteristics. A formal substitution is not required, but submittals must include sufficient data to show that the product has the same or similar characteristics to the products so indicated. The Architect/Engineer may reject any product, which, in his/her opinion, is not sufficiently similar to the indicated product.

1.24 SUBSTITUTIONS

A. Before making bid, Contactor may request pre-approval of a substitution. If substitution is

accepted in writing not less than ten (10) days before bid is accepted, it will be included in the agreement. If not, the Architect is under no obligation to accept the substitutions except as noted below.

B. Subsequent to acceptance of bid, substitutions will be considered only as an included part of a Construction Change Directive or Change Order when a product becomes unavailable or not practical due to no fault of Contractor or when the substitution is substantially to Owner's advantage (equal product for less cost or higher quality product at no change in Contract Sum).

C. For each request for substitution, prepare a copy of the Substitution Request Form found in Section 01 60 01.

D. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

E. Substitutions made on submittals (without previous approval) will not be considered.

1.25 ANCHORING TO NEW AND EXISTING CONSTRUCTION:

A. Do not anchor new items or new construction to existing construction in a way that will place an excessive load on the existing construction.

B. Plaster and Gypsum Board: Do not anchor anything directly to gypsum board or plaster, always anchor to the framing system or to wood blocking or to substrate to which the gypsum board or plaster is anchored

C. Hollow Masonry
   1. Do not anchor anything weighing more that 1 pound or capable of resulting in pressure being applied of more that 3 pounds in any direction to the face of hollow masonry.
   2. Where loads heavier than those listed above must be anchored to hollow concrete block, provide one of the following:
      a. Set anchor into core that has been grouted solid at the core where the anchor is set, at least one core above and two cores below.
      b. Provide a system that engages both walls of the concrete block and provides a rigid spacer/brace in the core between the walls similar to Hilti HIT HY 20 for Masonry Construction.
   3. Under no circumstances use impact driven fasteners on hollow masonry unless the cores are grouted solid.

D. See Section 01 73 29 for requirement for anchorage to existing construction.

1.26 DEMONSTRATION AND INSTRUCTIONS

A. Schedule demonstrations and instructions at the convenience of the Owner. Advise Owner not less than 48 hours before proposed time for demonstrations and instructions. Owner reserves the right to reject all proposed times which are not convenient for Owner's personnel.

B. Provide instruction to the Owner's personnel on operation and maintenance requirements. Owner shall be allowed to videotape all training.

C. Submit copy of signed attendance sheet to the Owner for all demonstration or instructional sessions.

1.27 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of Contract Documents, one set of shop drawings, and one set of manufacturer's installation instructions to be utilized for record documents.

B. Record actual revisions to the Work. Record information concurrent with construction progress.

C. Record all change to Contract Documents. Identify by ITC or CO number.

D. Specifications: Legibly mark and record at each Product Section (or on Drawings where specification appears on the Drawings) a description of actual Products installed.

E. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction.

F. Submit documents to Architect/Engineer before final Application for Payment.

1.28 FINAL CLEANING

A. Execute final cleaning prior to substantial completion inspection for each phase.

B. Dismantle and remove from the site all temporary barriers, closures and other temporary structures or materials.

C. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.29 OPERATION AND MAINTENANCE DATA

A. Bind in a three ring binders with durable covers.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", and title of project.

C. Internally subdivide the binder contents with permanent, tabbed page dividers, logically organized, with title clearly printed on or under reinforced laminated plastic tabs. Organize product data according to MasterFormat 04 numbering.

D. Contents:
   1. Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
   2. Product and system descriptions data.
   3. Operation and maintenance instructions, arranged by system.
   4. Project documents and certificates.

E. Submit one copy of completed volumes in final form with request for substantial completion site inspection. This copy will be returned after substantial completion with Architect/Engineer comments. Revise content of documents as required prior to final submittal.

F. Submit two copies of final volumes, revised, no later than the date of request for final inspection.

1.30 EXTENDED WARRANTIES

A. Provide two copies of all extended warranties.

B. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.

C. Submit with request for final inspection.

D. Include warranties under a separate page divider at the end of the Operation and Maintenance Manual or in a separate binder, labeled as described for the Operations and Maintenance Manual.

1.31 MAINTENANCE MATERIALS

A. Provide Products, spare parts, maintenance and extra materials in quantities specified in individual Specification Sections or on the Drawings.

B. Deliver to Project site and place in location as directed by Owner; deliver prior to final payment; obtain a written receipt.

1.32 CONTRACT CLOSEOUT PROCEDURES

A. Substantial Completion
   1. Submit with request for substantial completion inspection:
      a. List of incomplete work, value of incomplete work, and reasons for being incomplete.
      b. One copy of Operation and Maintenance Manuals completed volumes in final form. This copy will be returned after substantial completion inspection, with Architect/Engineer comments. Revise content of documents as required prior to final submittal.
   2. If Work is found to be acceptable, the Architect/Engineer will provide a certification of substantial completion accompanied by a Punchlist showing items not yet completed or not yet completed satisfactorily. Omission of an item from the Punchlist does not relieve Contractor from the requirement to completely conform to the Contract Documents.

B. Final Inspection
   1. Do not request a Final Inspection until all construction requirements of the Project have been met in conformance with the Contract Documents.
   2. Prior to requesting final inspection and final payment, as required by General Conditions, complete the following:
      a. Submit copy of final punchlist of work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance.
      b. Submit Project Record Documents.
      c. Submit proof, satisfactory to Owner, that fees and similar obligations of Contractor have been paid.
      d. Submit proof to the Owner that all keys borrowed during the course of the project have been returned.
      e. Submit TSB Final Payment Report Form, if applicable.
      f. Submit release from the Iowa Department of Revenue if the Contractor is not a resident of the State of Iowa.
      g. Deliver tools, spare parts, extra stocks of materials (if any), and similar physical items to Owner.
   3. Submit the following to the Architect/Engineer with request for final inspection:
      a. Written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's and Owner's Representative's inspection.
      b. Two copies of Operation and Maintenance Manuals, final volumes, revised.
      c. Two copies of Warranties, workmanship/maintenance bonds, agreements, final certifications and similar documents.
         1) For items of Work delayed materially beyond Date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of completion as start of warranty period.
      d. Written certification from product manufacturers stating that no asbestos containing materials have been installed in the Project. Statements are required from each manufacturer supplying materials installed on this job including those installed by all

subcontractors and sub-subcontractors.

4. Coordinate schedule of final inspection so that all parties required to view and approve the Work are present.

C. Complete items of work determined by Architect/Engineer's final inspection to be incomplete or unacceptable and request additional inspections as necessary.

D. Reinspection Costs: Should the Owner or the Architect/Engineer be required to perform additional Final Inspections because of failure of work to comply with Contract Documents, Contractor shall compensate Owner and/or Architect/Engineer for additional services. Owner may deduct the cost of the inspections from final payment to Contractor.

E. Final Acceptance and Payment
   1. Submit after final inspection and acceptance:
      a. Two copies of all inspections and certifications required by authorities having jurisdiction.
      b. Final Application for Payment, identifying total adjusted Contract Sum, previous payments, and amount remaining due.
      c. AIA Forms G706 - Contractor's Affidavit of Payment of Debts and Claims, G706A - Contractor's Affidavit of Release of Liens, and G707 - Consent of Surety to Final Payment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 7329

CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cutting

B. Patching

C. Minor modifications to assure exposed surfaces retain a finished appearance.

1.02 RELATED WORK

A. Section 01 14 00 - General Requirements

B. Section 02 4100 – Selective Demolition

1.03 SUBMITTALS

A. Product Data: Submit all materials to be used in patching that are not submitted under another Section of this Specification.

B. Cutting and Patching Proposal:
   1. Where cutting or patching is found to be necessary to accomplish the Work as described in the Construction Documents, provide a description of the cutting and/or patching to be done and the reason it is required. Include what materials and utilities will be affected.
   2. Where cutting or patching is discovered to involve structural elements of the building, which are not specifically called out on the drawings, immediately advise the Brooks Borg Skiles and request direction.

C. Approval by the Iowa Department of Transportation of cutting and patching proposal does not waive the Iowa Department of Transportation's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.04 PAYMENT FOR COSTS

A. Contractor shall be responsible for all costs of cutting and patching specifically stated in or reasonably implied by the Work described in the Construction Documents.

B. Contractor shall be responsible for all costs of cutting and patching caused by ill-timed or defective work, or work not conforming to contract documents, including costs for additional services of the Brooks Borg Skiles or Iowa Department of Transportation.

C. Work done on instructions of Brooks Borg Skiles or Iowa Department of Transportation (by change order), other than defective or non-conforming Work will be paid for by the Iowa Department of Transportation.

1.05 QUALITY ASSURANCE

A. Employ skilled worker to perform cutting and patching. Where work is of a specific trade (such as plaster) engage tradespersons skilled in that trade to execute the Work.

B. Requirements for Structural Work: Do not cut or patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
   1. Obtain approval of the cutting and patching proposal before cutting and patching structural elements including, but not limited to, the following:
      a. Foundation construction.
      b. Bearing and retaining walls.
      c. Structural concrete.

d. Structural steel.
e. Preformed metal panels
f. Lintels
g. Timber and primary wood framing.
h. Structural decking.
i. Stair systems.
j. Miscellaneous structural metals.
k. Equipment supports.
l. Piping, conduits, ductwork, vessels and equipment.

C. Operational and Safety Limitations: Do not cut or patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
1. Obtain approval of the cutting and patching proposal before cutting and patching operating elements or safety related systems including, but not limited to, the following:
a. Shoring, bracing, and sheeting.
b. Primary operational systems and equipment.
c. Air or smoke barriers.
d. Water, moisture, or vapor barriers.
e. Membrane and flashings.
f. Fire protection systems.
g. Noise and vibration control elements and systems.
h. Control systems.
i. Communication systems.
j. Conveying systems.
k. Electrical wiring systems.

PART 2 PRODUCTS

2.01 MATERIALS

A. Use materials for patching that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.
1. All substitute materials must be approved by the Iowa Department of Transportation before they may be used on the project.

B. Use materials whose thermal, chemical or similar properties will not adversely affect the existing materials to remain.

C. Where new materials are described in this Specification provide patching materials that conform to those Specification Sections in regard to quality unless otherwise indicated.

D. Where no specific description of materials is found in the Construction Documents, provide materials of Professional or Commercial quality, heavy duty and top quality, meeting the highest commonly used standards in the trade or specialty under which the Work in question would normally be performed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

B. Where the cutting involves elements normally handled by differing trades, before proceeding, coordinate with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.02 PREPARATION

A. Temporary Support: Provide all temporary support of Work to be cut as required to maintain the structural integrity of the remaining construction and as necessary to provide for a safe environment.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Cutting of existing pipe, conduit or ductwork serving the building, which is indicated to be removed or relocated, must be schedule only after adequate provisions have been made to bypass them. Services must be maintained at all times.

3.03 PERFORMANCE

A. General
   1. Proceed with cutting and patching at the earliest feasible time and complete without delay.
   2. Provide all cutting of existing construction as necessary to provide for installation of other components or performance of other construction activities or the subsequent fitting and patching required to restore surfaces to their original condition.
   3. If utilities or structural elements of the construction are encountered which are not specifically noted on the Drawings, immediately inform the Brooks Borg Skiles and await a response before proceeding.

B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction.
   1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping.
   2. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces.
   3. Temporarily cover openings when not in use.
   4. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
   5. Cut no utilities without specific, written authorization from the Owner.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
   1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
   2. Where removal of walls or partitions extends one finished area into another, patch and repair floor, wall and ceiling surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor, wall and ceiling coverings and replace with new materials, if necessary to achieve uniform color and appearance.
   3. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
      a. Where a patch occurs, refinish the entire surface to a point where the surface changes such as at a corner, a joint, a change in plane or a change in material or color.
      b. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken area containing the patch, after the patched area has received primer and second coat.

D. Anchoring to Existing:
   1. Do not anchor new items or new construction to existing construction in a way that will place an excessive load on the existing construction.
   2. Plaster and Gypsum Board
      a. Do not anchor anything directly to gypsum board or plaster, always anchor to the framing system or substrate to which the gypsum board or plaster is anchored. If necessary open the gypsum board or plaster wall, provide additional blocking and repair the surface.
   3. Hollow Masonry
      a. Do not anchor anything weighing more that 1 pound or capable of resulting in pressure being applied of more that 3 pounds in any direction to the face of hollow masonry.
      b. Where loads heavier than those listed above must be anchored to hollow masonry units, provide one of the following:
         1) Open the core and grout solid at the core into which the anchor is to be placed plus at least one core above and two cores below where the anchor is to be placed. Patch and finish the surface of the block to match surrounding block.
         2) Provide a system that engages both walls of the hollow masonry unit and provides a rigid spacer/brace in the core between the walls similar to Hilti HIT HY 20 for Masonry Construction.
      c. Under no circumstances use impact driven fasteners on hollow masonry unless the cores are grouted solid.

3.04 CLEANING

A. Immediately thoroughly clean walls to remove "runs" or "drips" after saw cutting or core-drilling penetrations though CMU or concrete

B. Thoroughly clean areas and spaces where cutting and patching is performed or used as access including cleaning piping, metal framing, conduits, ducts and other similar features.

C. Thoroughly clean and prepare all surfaces before painting or other finishing is applied.

D. Remove completely paint, mortar, oils, putty and items of similar nature that are not a part of the intended finish.

END OF SECTION

SECTION 26 0511

REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings. Capacities and ratings of motors, transformers, cable, panelboards, and other items and arrangements for the specified items are shown on drawings or schedules.

B. Wiring ampacities specified, scheduled, or shown on the drawings are based on copper conductors unless otherwise noted, with the conduit and raceways accordingly sized.

1.02 MINIMUM REQUIREMENTS

A. References to the International Building Code (IBC), National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL) and National Fire Protection Association (NFPA) are minimum installation requirement standards.

B. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the above standards.

1.03 TEST STANDARDS

A. All materials and equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc., standards where test standards have been established. Equipment and materials which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as NEMA, or ANSI. Evidence of compliance shall include certified test reports and definitive shop drawings.

B. Definitions:
   1. Listed: Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production or listed equipment or materials or periodic evaluation of services, and whose listing states that the equipment, material, or services either meets appropriate designated standards or has been tested and found suitable for a specified purpose.
   2. Labeled: Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
   3. Certified: equipment or product which:
      a. Has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner.
      b. Production of equipment or product is periodically inspected by a nationally recognized testing laboratory.
      c. Bears a label, tag, or other record of certification.
   4. Nationally recognized testing laboratory; laboratory which is approved, in accordance with OSHA regulations, by the Secretary of Labor.

1.04 QUALIFICATIONS (PRODUCTS AND SERVICES)

A. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years.

B. Product Qualification: Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.

C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within four hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.05 MANUFACTURED PRODUCTS

A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts shall be available.

B. When more than one unit of the same class or type of equipment is required, such units shall be the product of a single manufacturer.

C. Equipment Assemblies and Components:
   1. Components of an assembled unit need not be products of the same manufacturer.
   2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
   3. Components shall be compatible with each other and with the total assembly for the intended service.
   4. Constituent parts which are similar shall be the product of a single manufacturer.

D. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.

1.06 EQUIPMENT PROTECTION

A. Equipment and materials shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.
   1. Store equipment indoors in clean dry space with uniform temperature to prevent condensation. Equipment shall include but not be limited to switchgear, switchboards, panelboards, transformers, motor control centers, motor controllers, uninterruptible power systems, enclosures, controllers, circuit protective devices, cables, wire, light fixtures, wiring devices, electronic equipment, and accessories.
   2. During installation, equipment shall be protected against entry of foreign matter; and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
   3. Damaged equipment shall be, as determined by the Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement.
   4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
   5. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.07 WORK PERFORMANCE

A. All electrical work must comply with the requirements of NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J, OSHA Part 1910 subpart S and OSHA Part 1910 subpart K in addition to other references required by contract.

B. Job site safety and worker safety is the responsibility of the contractor.

C. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished in this manner for the required work, the following requirements are mandatory:
   1. Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.
   2. Electricians must wear personal protective equipment while working on energized systems in accordance with NFPA 70E.
   3. Before initiating any work, a job specific work plan must be developed by the contractor with a peer review conducted and documented. The work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, safety equipment to be used and exit pathways.
   4. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the Owner.

D. New work shall be installed and connected to existing work neatly, safely and professionally. Disturbed or damaged work shall be replaced or repaired to its prior conditions. Existing installation conditions discovered or uncovered during the course of new work shall be reported to Construction Manager or Engineer as soon as practical and not later than the end of the day the condition is discovered.

E. Coordinate location of all equipment and conduit with other trades to minimize interferences.

1.08 EQUIPMENT INSTALLATION AND REQUIREMENTS

A. Equipment location shall be as close as practical to locations shown on the drawings.

B. Working spaces shall not be less than specified in the NEC for all voltages specified.

C. Inaccessible Equipment:
   1. Where the Engineer determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Owner.
   2. "Conveniently accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

1.09 EQUIPMENT AND PATHWAY IDENTIFICATION

A. As defined in Section 260553 - Identification for Electrical Systems.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Wire and cable for 600 volts and less.

C. Wiring connectors.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

A. Product Data: Provide for each cable assembly type.

B. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

C. Project Record Documents:
   1. Record actual locations of components and circuits.
   2. Record actual installed lengths of panelboard and transformer feeders and all other circuits 400A or greater for calculation requirements of Section 260571.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Use conductor not smaller than 12 AWG for power and lighting circuits unless otherwise indicated.

D. Use conductor not smaller than 16 AWG for control circuits.

2.02 BUILDING WIRE

A. Description: Single conductor insulated wire for installations 600V or less.

B. Conductor Stranding:
   1. Feeders and Branch Circuits:

a. Size 10 AWG and Smaller: Stranded.
b. Size 8 AWG and Larger: Stranded.

C. Conductor: Copper.

D. Insulation Voltage Rating: 600 volts.

E. Insulation: NFPA 70.
1. THHN/THWN for interior work in conduit.
2. XHHW-2 for underground and exterior work in conduit.

2.03 COLOR CODING

A. All voltages and systems - provide colored insulation for wires. Wire sizes 25 mm² (4 AWG) and larger shall be permitted to be identified per NEC.

B. Coordinate color and phase rotation to match existing facility scheme.

C. Grounding systems:
1. Equipment Ground = green.
2. Isolated ground = green with yellow stripe or green with yellow tape bands.

D. 208Y/120VAC, 3 Ph., 4 w. systems:
1. Phase A = Black.
2. Phase B = Red.
3. Phase C = Blue.
4. Neutral = White.

E. 480Y/277VAC, 3 Ph., 4 w. systems:
1. Phase A = Brown.
2. Phase B = Orange.
3. Phase C = Yellow.
4. Neutral = Gray.

2.04 SURGE SUPRESSION

A. Building Entrance Primary Surge Protector: Factory fabricated panel to connect incoming cable and interior cable to protector modules.
1. Capacity: One protector module per pair of incoming cable.
2. Protector Modules: Type rated for the application.
a. Solid State Type: Complying with UL 497

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage wire and cable has been completed.

B. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

C. Verify that raceway installation is complete and supported.

D. Verify that field measurements are as shown on the drawings.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. When circuit destination is indicated and routing is not shown, determine exact routing required.
   2. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.

B. Install products in accordance with manufacturer's instructions.

C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

D. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

E. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

F. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

G. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.

H. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
   1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
   2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
      b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.

I. Provide wire and cable markers in accordance with Section 26 0553 identifying circuit number or other designation indicated at the following locations:
   1. At each load connection.
   2. Within boxes.
   3. Within equipment enclosures.

J. Use suitable wire pulling lubricant for building wire 4 AWG and larger.

K. Neatly train and lace wiring inside boxes, equipment, and panelboards.

L. Clean conductor surfaces before installing lugs and connectors.

M. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

3.04 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA STD ATS, except Section 4.

B. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2.

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 5 ohms.

1.02 SUBMITTALS

A. Test Reports: Indicate overall resistance to ground and resistance of each electrode.

B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

C. Project Record Documents: Record actual locations of components and grounding electrodes.

1.03 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONNECTORS AND ACCESSORIES

A. Mechanical Connectors: Bronze.

B. Exothermic Connections: Cadweld.

2.02 GROUNDING AND BONDING CONDUCTORS

A. Equipment grounding conductors shall be UL 83 insulated stranded copper, except that sizes 10 AWG (6 mm^2) and smaller shall be solid copper unless otherwise noted. Insulation color shall meet the requirements of Section 260519.

B. Bonding conductors shall be ASTM B8 bare stranded copper, except that sizes 10 AWG (6 mm^2) and smaller shall be ASTM B1 solid bare copper wire.

C. Electrical System Grounding: Conductor sizes shall not be less than what is shown on the drawings and not less than required by the NEC, whichever is greater.

2.03 GROUND RODS

A. Copper, 3/4-inch (19 mm) diameter by 10 feet (3000 mm) long, conforming to UL 467.

B. Quantity of rods required at each grounding field location shall be as required to obtain the specified ground resistance.

2.04 SPLICES AND TERMINATION COMPONENTS

A. Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).

2.05 GROUND CONNECTIONS

A. Below Grade: Exothermic-welded type connectors.

B. Interior:
   1. Bonding Jumpers: compression type connectors, using zinc-plated fasteners and external tooth lockwashers.

2. Ground Busbars: Two-hole compression type lugs using tin-plated copper or copper alloy bolts and nuts.
3. Rack and Cabinet Ground Bars: one-hole compression-type lugs using zinc-plated or copper alloy fasteners.

2.06 EQUIPMENT RACK AND CABINET GROUND BARS

A. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks with minimum dimensions of 3/8 inch x ¾ inch (4 mm thick by 19 mm wide).

B. Ensure cabinet doors are bonded to cabinets with #12 or larger stranded conductor.

2.07 GROUND TERMINAL BLOCKS

A. At any equipment mounting location (e.g. backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide screw lug-type terminal blocks.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions prior to beginning work.

B. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.02 GENERAL

A. Ground in accordance with the NEC, as shown on drawings, and as hereinafter specified.

B. Equipment Grounding: Metallic structures (including ductwork and building steel), enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, foundation rebar, tower structure, and other conductive items in close proximity with electrical circuits shall be bonded and grounded.

3.03 INACCESSIBLE GROUNDING CONNECTIONS

A. Make grounding connections, which are buried or otherwise normally inaccessible (except connections for which periodic testing access is required) by exothermic weld.

3.04 CORROSION INHIBITORS

A. When making ground and ground bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.05 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
   1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches (150 mm) below finished grade.

D. Make grounding and bonding connections using specified connectors.

1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.

E. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing. Bond steel together.

F. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.06 WIREWAY GROUNDING

A. Ground and Bond Metallic Wireway Systems as follows:
1. Bond the metallic structures of wireway to provide 100 percent electrical continuity throughout the wireway system by connecting a 6 AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.
2. Install insulated 6 AWG bonding jumpers between the wireway system bonded as required in paragraph 1 above, and the closest building ground at each end and approximately every 50 feet (16 meters).

3. Use insulated 6 AWG bonding jumpers to ground or bond metallic wireway at each end at all intermediate metallic enclosures and cross all section junctions.

3.07 GROUND RESISTANCE

A. Grounding system resistance to ground shall not exceed 5 ohms. Final tests shall assure that this requirement is met. Report discrepancies to Engineer.

B. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

C. Prepare and submit a report showing layout and the measured values resulting from ground resistance tests for each grounding electrode system.

D. Below-grade connections shall be photgraphed by the Contractor prior to backfilling. Provide electronic copies of photos to Engineer.

3.08 GROUND ROD INSTALLATION

A. Drive each rod vertically in the earth, not less than 10 feet (3000 mm) in depth.

B. Make permanently concealed ground connections by the exothermic process to form solid metal joints.

C. Where rock prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified resistance.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Conduit and equipment supports.

B. Anchors and fasteners.

1.02 REFERENCE STANDARDS

A. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2010

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MATERIALS

A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.

B. Supports: Fabricated of structural steel or formed steel members; galvanized.

C. Anchors and Fasteners:
   1. Obtain permission from Brooks Borg Skiles before using powder-actuated anchors.
   2. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
   3. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
   4. Solid Masonry Walls: Use expansion anchors or preset inserts.
   5. Sheet Metal: Use sheet metal screws.
   6. Wood Elements: Use wood screws.

D. Fastener Types:
   1. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
   2. Masonry Screw Type Anchors: Complying with ICC-ES AC106.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
   1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
   2. Do not drill or cut structural members.

B. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

C. Install surface-mounted cabinets and panelboards with minimum of four anchors.

D. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch (25 mm) off wall.

END OF SECTION

SECTION 26 0534

CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Conduit, fittings and conduit bodies.

1.02 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.

B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

C. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.

D. NECA 101 - Standard for Installing Steel Conduit (Rigid, IMC, EMT); National Electrical Contractors Association; 2006.

E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2007.

F. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; National Electrical Manufacturers Association; 2005.

G. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit; National Electrical Manufacturers Association; 2003.

H. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing; National Electrical Manufacturers Association; 2004.

I. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide for metallic conduit, flexible metal conduit, liquidtight flexible metal conduit, metallic tubing, nonmetallic conduit, flexible nonmetallic conduit, nonmetallic tubing, fittings, and conduit bodies.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

B. Protect PVC conduit from sunlight.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Exterior, Direct-Buried: Use PVC-coated galvanized steel rigid metal conduit or rigid PVC conduit.

D. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

2.02 CONDUIT REQUIREMENTS

A. Communications Systems Conduits: Also comply with Section 27 1005.

B. Fittings for Grounding and Bonding: Also comply with Section 26 0526.

C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

D. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.

E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

C. Conduit Size: Comply with NFPA 70.
   1. Minimum Size: 3/4 inch (19 mm) unless otherwise specified.

2.05 ELECTRICAL METALLIC TUBING (EMT)

A. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use compression (gland) type.
   4. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.

B. Description: ANSI C80.3; galvanized tubing.

C. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron compression type.

2.06 HDPE ELECTRICAL CONDUIT

A. Material Density: High.

B. Pipe Diameter: 2" or as specified elsewhere.

C. Standard Dimension Ratio (SDR): 11.

D. Color: Use one color for voltages over 600 volts and fiber optic cables. Use different color for other uses. Coordinate with national color standards and other uses on site.

E.

2.07 ACCESSORIES

A. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

B. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force (890 N).

C. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.

D. Description: NEMA TC 2.

E. Fittings and Conduit Bodies: NEMA TC 3.

2.08 MATERIALS AND COMPONENTS FOR PENETRATIONS THROUGH WALLS AND FLOORS

A. Fire Rated Sealant: Three hour fire rated; similar and equal to Flameseal manufactured by Nelson Electric, Tulsa, Oklahoma.

B. Non-Fire Rated Sealant: Capable of sealing out water, dust and gases; for manual or calking gun application; similar and equal to Crouse Hinds type EYS.

C. Cable Tray Fire Protection: Capable of preserving rating of wall penetrated; similar and equal to Nelson Electric - PLW Firestop Pillow.

D. Grout: Non-shrink non-metallic type; similar and equal to Crystex.

E.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install intermediate metal conduit (IMC) in accordance with NECA 101.

E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

F. Penetrations:
   1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
   2. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
   3. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified.

G. Underground Installation:
   1. Provide trenching and backfilling in accordance with Sections 31 2316 and 31 2317.
   2. Minimum Cover, Unless Otherwise Indicated or Required:
      a. Underground, Exterior: 30 inches.
   3. Ensure splices required in HDPE piping have tensile strength to withstand pulling tensions.
   4. Pull boxes required in exterior runs over 300 feet, or when more than three 90 degree bends are used, or when pulling tension of cable intended for installation requires an intermediate pull box, or as indicated on Drawings.

H. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

D. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

B. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.

C. Install steel conduit as specified in NECA 101.

D. Install nonmetallic conduit in accordance with manufacturer's instructions.

E. Arrange supports to prevent misalignment during wiring installation.

F. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

G. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.

H. Fasten conduit supports to building structure and surfaces under provisions of Section 26 0529.

I. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

J. Do not attach conduit to ceiling support wires.

K. Arrange conduit to maintain headroom and present neat appearance.

L. Route exposed conduit parallel and perpendicular to walls.

M. Maintain adequate clearance between conduit and piping.

N. Cut conduit square using saw or pipecutter; de-burr cut ends.

O. Bring conduit to shoulder of fittings; fasten securely.

P. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate bends in metal conduit larger than 2 inch (50 mm) size.

Q. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

R. Provide suitable fittings to accommodate expansion and deflection where conduit crosses expansion joints.

S. Provide suitable pull string in each empty conduit except sleeves and nipples.

T. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

U. Ground and bond conduit under provisions of Section 26 0526.

V. Identify conduit under provisions of Section 26 0553.

END OF SECTION

SECTION 26 0537

BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall and ceiling outlet boxes.

B. Pull and junction boxes.

1.02 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 26 2726 - Wiring Devices: Wall plates in finished areas.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.

B. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2008.

C. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; National Electrical Manufacturers Association; 2008.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.

E. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Provide products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 OUTLET BOXES

A. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.

2.02 PULL AND JUNCTION BOXES

A. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
   1. Material: Galvanized cast iron.
   2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify locations of floor boxes and outlets in offices and work areas prior to rough-in.

3.02 INSTALLATION

A. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.

B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.

C. Maintain headroom and present neat mechanical appearance.

D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

E. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

F. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches (305 mm) of box.

G. Use cast outlet box in exterior locations exposed to the weather and wet locations.

END OF SECTION

SECTION 26 0541

UNDERGROUND ELECTRICAL CONSTRUCTION

PART 1 GENERAL

1.01 DESCRIPTION

A. This section specifies the furnishing and installation of ducts to form a complete underground raceway system.

B. “Duct” and “conduit”, and “rigid metallic conduit” and “rigid steel conduit" are used interchangeably in this specification and have the same meaning.

1.02 SUBMITTALS

A. Shop Drawings:
   1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

B. Certifications: Two weeks prior to final inspection, submit four copies of the following to the Engineer:
   1. Certification that the materials are in accordance with the drawings and specifications.
   2. Certification, by the Contractor, that the complete installation has been properly installed and tested.

PART 2 PRODUCTS

2.01 Ducts:

A. Number and sizes shall be as shown on drawings.

B. Ducts (direct burial):
   1. Plastic duct:
      a. NEMA TC2 and TC3
      b. UL 651, 651A and 651B, Schedule 80 PVC or HDPE.
      c. Duct shall be suitable for use with 75 degree C rated conductors.

2.02 WARNING Tape:

A. Standard 4-mil polyethylene 76 mm (3 inch) wide tape, detectable type, red with black letters, imprinted with “CAUTION BURIED ELECTRIC CABLE BELOW”.

2.03 PULL Rope:

A. Plastic with 890N (200 pound) minimum tensile strength.

PART 3 EXECUTION

3.01 TRENCHING

A. Work with extreme care near existing ducts, conduits, cables, and other utilities to avoid damaging them.

B. Follow Iowa One Call Professional Excavators Manual to locate all existing underground utilities.

C. All existing utilities identified on drawings must be located by method of hand-digging to identify exact size, quantity, and depth at utility crossing. Provide As-Built documentation for each utility verified.

D. Prior to beginning any underground work perform site walkthough with Owner's representative to verify all know utilities are properly identified.

E. Cut the trenches neatly and uniformly.

F. For

G. Install continuous strip of Warning Tape at 12" above utility when backfilling.

H. Conduits to be installed under existing paved areas, roads, and railroad tracks that are not to be disturbed shall be jacked into place. Conduits shall be PVC-coated rigid metal.

3.02 DUCT INSTALLATION

A. General Requirements:
   1. Ducts shall be in accordance with the NEC and IEEE C2, as shown on the drawings, and as specified.
   2. Slope ducts to drain towards manholes and handholes, and away from building and equipment entrances. Pitch not less than 100 mm (4 inches) in 30 M (100 feet).
   3. Underground conduit stub-ups and sweeps to equipment inside of buildings shall be PVC-coated galvanized rigid steel, and shall extend a minimum of 1500 mm (5 feet) outside of building foundation.
   4. Stub-ups, sweeps, and risers to equipment mounted on outdoor concrete slabs shall be PVC-coated galvanized rigid steel, and shall extend a minimum of 1500 mm (5 feet) away from edge of slab.
   5. Install insulated grounding bushings on the terminations.
   6. PVC coated rigid steel conduit turns of direction for all duct lines shall have minimum 1200 mm (4 feet) radius in the horizontal and vertical directions. PVC conduit sweeps for all duct lines shall have a minimum 12000 mm (40 feet) radius in the horizontal and 1200 mm (4 feet) in the vertical directions. Where a 12000 mm (40 feet) radius is not possible, horizontal turns of direction shall be rigid steel.
   7. All multiple conduit runs shall have conduit spacers. Spacers shall securely support and maintain uniform spacing of the duct assembly a minimum of 75 mm (3 inches) above bottom of trench during the concrete pour. Spacer spacing shall not exceed 1500 mm (5 feet).
   8. Duct lines shall be installed no less than 300 mm (12 inches) from other utility systems, such as water, sewer, and chilled water.
   9. Clearances between individual ducts:
      a. For like services, not less than 75 mm (3 inches).
      b. For power and signal services, not less than 150 mm (6 inches).
      c. Provide plastic spacers to maintain clearances.
      d. Provide nonferrous tie wires to prevent displacement of the ducts during pouring of concrete. Tie wires shall not act as substitute for spacers.
   10. Couple the ducts with proper couplings. Stagger couplings in rows and layers to insure maximum strength and rigidity of the duct bank.
   11. Keep ducts clean of earth, sand, or gravel during construction, and seal with tapered plugs upon completion of each portion of the work.

B. Direct Burial Duct and Conduits:
   1. Install direct burial ducts and conduits only where shown on the drawings.
   2. Join and terminate ducts and conduits with fittings recommended by conduit manufacturer.
   3. Tops of ducts and conduits shall be:
      a. Not less than 600 mm (24 inches) and not less than shown on the drawings, below finished grade.
      b. Not less than 750 mm (30 inches) and not less than shown on the drawings, below roads and other paved surfaces.
   4. Do not kink the ducts or conduits.

C. Duct and Conduit Cleaning:

1. Upon completion of the duct bank installation or installation of direct buried ducts, a standard flexible mandrel shall be pulled through each duct to loosen particles of earth, sand, or foreign material left in the line. The mandrel shall be not less than 3600 mm (12 inches) long, and shall have a diameter not less than 13 mm (1/2 inch) less than the inside diameter of the duct. A brush with stiff bristles shall then be pulled through each duct to remove the loosened particles. The diameter of the brush shall be the same as, or slightly larger than the diameter of the duct.

D. Duct and Conduit Sealing: Seal the ducts and conduits at building entrances, and at outdoor terminations for equipment, with a suitable non-hardening compound to prevent the entrance of moisture and gases.

END OF SECTION

SECTION 26 0553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Warning signs and labels.

E. Junction box cover painting.

1.02 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2007.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2007.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. Product Data: Provide catalog data for nameplates, labels, and markers.

B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Transformers:
         1) Identify kVA rating.
         2) Identify voltage and phase for primary and secondary.
         3) Identify power source. Include location when not within sight of equipment.
      b. Enclosed switches, circuit breakers, and motor controllers:
         1) Identify voltage and phase.
         2) Identify power source. Include location when not within sight of equipment.

B. Identification for Conductors and Cables:
   1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
   2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

2.02 NAMEPLATES

A. Identification Nameplates:
   1. Materials:
      a. Indoor Clean, Dry Locations: Use plastic nameplates.
      b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
   2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
   3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
   4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
   5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.

B. Identification Labels:
   1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
   2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Nameplates for Normal Power System equipment shall be laminated black phenolic resin with a white core with engraved lettering.

D. Nameplates shall identify the following:
   1. Equipment ID.
   2. Voltage/Phase/# of Wires
   3. Wire Size
   4. Where the equipment is Fed From

E. Locations:
   1. All motor starters, motor controls, motor control centers, push-button stations, control panels and time switches.
   2. All disconnect switches, panelboards, switchboards.
   3. All feeder breakers installed in switchboards and distribution panelboards.

F. Letter Size:
   1. Use 1/2 inch (12 mm) high letters.

2.03 LABELS

A. Labels shall identify panelboard and branch circuit breaker position for installed power wiring.

B. Locations:
   1. Blank cover plates on gutters, pull boxes, and junction boxes.

C. Labels: Embossed adhesive tape, with 3/16 inch (5 mm) black letters on white background.

2.04 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

E. Minimum Text Height: 1/8 inch (3 mm).

F. Color: Black text on white background unless otherwise indicated.

G. Description: Vinyl cloth or Nylon type self-adhesive wire markers.

H. Locations: Each conductor at panelboard gutters, pull boxes, outlet boxes, and junction boxes each load connection.

2.05 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
   1. Materials:
      a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
      b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
   2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
   3. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.

C. Warning Labels:
   1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester, or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
   2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
   3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

B. Degrease and clean surfaces to receive nameplates and labels.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Inside of equipment door.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Elevated Equipment: Legible from the floor or working platform.
   5. Interior Components: Legible from the point of access.
   6. Conductors and Cables: Legible from the point of access.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing, or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Secure rigid signs using stainless steel screws.

END OF SECTION

SECTION 26 2200

LOW-VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General purpose transformers.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0553 - Identification for Electrical Systems: Nameplates.

C. Section 26 0534 - Conduit: Flexible conduit connections.

1.03 REFERENCE STANDARDS

A. IEEE C57.94 - Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type General Purpose Distribution and Power Transformers; 1982 (R2006).

B. IEEE C57.96 - Guide for Loading Dry-Type Distribution and Power Transformers; 1999 (R2004).

C. NECA 1 - Standard for Good Workmanship in Electrical Contracting; 2006.

D. NECA 409 - Recommended Practice for Installing and Maintaining Dry-Type Transformers; 2002.

E. NEMA ST 20 - Dry-Type Transformers for General Applications; National Electrical Manufacturers Association; 1992 (R1997).

F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008

G. NEMA TP 1 - Guide for Determining Energy Efficiency for Distribution Transformers; 2002.

H. NEMA TP 2 - Standard Test Method for Measuring the Energy Consumption of Distribution Transformers; 2005.

I. NEMA TP 3 - Standard for the Labeling of Distribution Transformer Efficiency; 2000.

J. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

K. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

L. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide outline and support point dimensions of enclosures and accessories, unit weight, voltage, kVA, and impedance ratings and characteristics, tap configurations, insulation system type, and rated temperature rise.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Maintenance Data: Include recommended maintenance procedures and intervals.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Siemens Industry, Inc: www.siemens.com.

B. Eaton Electrical/Cutler-Hammer: www.eatonelectrical.com.

C. GE Industrial: www.geindustrial.com.

D. Square D: www.squared.com.

E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ALL TRANSFORMERS

A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed and labeled by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
   1. Altitude: Less than 3,300 feet (1,000 m).
   2. Ambient Temperature: Not exceeding 86 degrees F (30 degrees C) average or 104 degrees F (40 degrees C) maximum measured during any 24 hour period.

C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.

D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.

E. Basic Impulse Level: 10 kV.

F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

G. Isolate core and coil from enclosure using vibration-absorbing mounts.

H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.03 GENERAL PURPOSE TRANSFORMERS

A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.

B. Primary Voltage: 480 volts delta, 3 phase.

C. Secondary Voltage: 208Y/120 volts, 3 phase.

D. Insulation System and Allowable Average Winding Temperature Rise:
   1. Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

E. Coil Conductors: Continuous copper windings with terminations brazed or welded.

F. Winding Taps:
   1. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.

G. Energy Efficiency: Standard efficiency complying with NEMA TP 1.
   1. Test efficiency according to NEMA TP 2.
   2. Label transformer according to NEMA TP 3.

H. Sound Levels: Standard sound levels complying with NEMA ST 20.

I. Mounting Provisions:
   1. 15 kVA through 75 kVA: Suitable for floor mounting.

J. Transformer Enclosure: Comply with NEMA ST 20.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
   2. Construction: Heavy gage steel.
      a. 15 kVA and Larger: Ventilated.
   3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
   4. Provide lifting eyes or brackets.

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1.

B. Install transformers in accordance with manufacturer's instructions.

C. Install transformers in accordance with NECA 409 and IEEE C57.94.

D. Use flexible conduit, under the provisions of Section 26 0534, 2 feet (600 mm) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.

F. Set transformers plumb and level.

G. Use flexible conduit, under the provisions of Section 26 0534, 2 feet (600 mm) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

H. Mount trapeze-mounted transformers as indicated.

I. Provide grounding and bonding in accordance with Section 26 0526.

J. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.

K. Where not factory-installed, install lugs sized as required for termination of conductors as shown on the drawings.

L. Install transformer identification nameplate in accordance with Section 26 0553.

3.02 ADJUSTING

A. Measure primary and secondary voltages and make appropriate tap adjustments.

B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

END OF SECTION

SECTION 26 2716

ELECTRICAL CABINETS AND ENCLOSURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hinged cover enclosures.

B. Cabinets.

C. Terminal blocks.

D. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 26 0529 - Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.

C. NEMA ICS 1 - Industrial Control and Systems - General Requirements. National Electrical Manufacturer's Association; 2000.

D. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks; National Electrical Manufacturers Association; 2005.

E. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard data for enclosures and cabinets.

B. Shop Drawings: For equipment panels, indicate wiring schematic diagrams, outline drawings of components in enclosure, mounting details, and construction diagrams per NEMA ICS 1.

C. Cabinet Keys: Deliver to Iowa Department of Transportation in accordance with Section 01 6000 for maintenance materials.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 HINGED COVER ENCLOSURES

A. Construction: NEMA 250, Type 1 steel enclosure.

B. Size: As required for neat, orderly, workmanlike installation of required equipment, maintaining electrical, mechanical and environmental clearances in accordance with component manufacturer's installation instructions.

C. Covers: Continuous hinge, held closed by flush latch operable by screwdriver.

D. Provide interior metal panel for mounting terminal blocks and electrical components; finish with white enamel.

E. Enclosure Finish: Manufacturer's standard enamel.

2.02 TERMINAL BLOCKS

A. Terminal Blocks: NEMA ICS 4.

B. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.

C. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.

D. Provide ground bus terminal block, with each connector bonded to enclosure.

2.03 ACCESSORIES

A. Plastic Raceway: Plastic channel with hinged or snap-on cover.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install securely, in a neat and workmanlike manner, as specified in NECA 1.

B. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner under the provisions of Section 26 0529.

C. Install cabinet fronts plumb.

3.02 CLEANING

A. Clean electrical parts to remove conductive and harmful materials.

B. Remove dirt and debris from enclosure.

C. Clean finishes and touch up damage.

END OF SECTION

SECTION 26 2717

EQUIPMENT WIRING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

A. Section 26 0534 - Conduit.

B. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables (600 V and Less).

C. Section 26 0537 - Boxes.

D. Section 26 2818 - Enclosed Switches.

1.03 REFERENCE STANDARDS

A. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2005).

B. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R2008).

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 3 EXECUTION

2.01 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

D. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

E. Install terminal block jumpers to complete equipment wiring requirements.

F. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

SECTION 26 2726

WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Receptacles.

B. Wall plates.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0537 - Boxes.

C. Section 26 2717 - Equipment Wiring: Cords and plugs for equipment.

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Federal Specification; Revision G, 2001.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

C. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2005).

D. NEMA WD 6 - Wiring Device -- Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R2008).

E. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

F. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

G. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

H. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

C. Certificates for Surge Protection Receptacles: Manufacturer's documentation of listing for compliance with UL 1449.

PART 2 PRODUCTS

2.01 ALL WIRING DEVICES

A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.02 RECEPTACLES

A. All Receptacles: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.

1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
2. NEMA configurations specified are according to NEMA WD 6.

B. GFI Receptacles:
1. All GFI Receptacles: Provide with feed-through protection, light to indicate ground fault tripped condition and loss of protection, and list as complying with UL 943, class A.
2. Weather Resistant GFI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.03 WALL PLATES

A. All Wall Plates: Comply with UL 514D.
1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
2. Size: Standard; _____.
3. Screws: Metal with slotted heads finished to match wall plate finish.

B. Weatherproof Covers for Wet Locations: Gasketed, clear thermoplastic, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected.

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of wiring devices provided under this section.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Install wiring devices plumb and level with mounting yoke held rigidly in place.

I. Install wall switches with OFF position down.

J. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

K. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

L. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

END OF SECTION

SECTION 26 2813

FUSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fuses.

1.02 REFERENCE STANDARDS

A. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; 2002 (R2007).

B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data sheets showing electrical characteristics, including time-current curves.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cooper Bussmann: www.bussmann.com.

B. Ferraz Shawmut, Inc: www.ferrazshawmut.com.

C. Littelfuse: www.littelfuse.com.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FUSES - GENERAL

A. Dimensions and Performance: NEMA FU 1, Class as specified or indicated.

B. Voltage: Rating suitable for circuit phase-to-phase voltage.

C. General Purpose Branch Circuits: Class RK1 (time delay).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install fuses with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION

SECTION 26 2818

ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fusible switches.

1.02 RELATED REQUIREMENTS

A. Section 26 2813 - Fuses.

1.03 REFERENCE STANDARDS

A. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; 2002 (R2007).

B. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association; 2001 (R2006).

C. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide switch ratings and enclosure dimensions.

C. Project Record Documents: Record actual locations of enclosed switches.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Eaton Corporation; Cutler-Hammer Products: www.eaton.com.

B. General Electric Company: www.geindustrial.com.

C. Square D: www.squared.com.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COMPONENTS

A. Fusible Switch Assemblies: NEMA KS 1, Type HD enclosed load interrupter knife switch.
   1. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
   2. Handle lockable in OFF and ON positions.
   3. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses.

B. Enclosures: NEMA KS 1.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install fuses in fusible disconnect switches.

C. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

END OF SECTION

SECTION 26 3219

WIND ENERGY EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wind energy system requirements.

B. Wind turbine.

C. Wind turbine tower.

D. Wind turbine drive system.

E. Wind turbine controller and monitoring system.

1.02 REFERENCE STANDARDS

A. IEEE 1547 - Standard for Interconnecting Distributed Resources with Electric Power Systems; 2003 (Reaff 2008).

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.

D. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

F. UL 1741 - Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 1400 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.

C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, attachment locations and details, and proposed size, type, and routing of conduits and cables. Include system interconnection schematic diagrams showing all factory and field connections.

D. Design Data:
   1. Include structural calculations, certified by structural engineer, for equipment and mounting system.

E. Certify that products of this section meet or exceed specified requirements.

F. Installer's Qualifications: Include evidence of compliance with specified requirements.

G. Provide information and assistance to owner and engineer in preparation and submission of local utility company's interconnection request application form.

H. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

I. Manufacturer's detailed field testing procedures.

J. Manufacturer's detailed startup procedures.

K. Utility interconnection documentation.

L. Source quality control test reports.

M. Field quality control test reports.
   1. Include manufacturer's field reports.

N. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

O. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Iowa Department of Transportation's name and registered with manufacturer.

P. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging, keep dry and protect from damage until ready for installation.

1.05 WARRANTY

A. See Section 01 1400 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wind Energy System - Basis of Design: Polaris America LLC. P10-20, 3-Phase Wind Turbine Installation.

2.02 WIND ENERGY SYSTEM REQUIREMENTS

A. System Description:
   1. Wind turbine.
   2. Wind turbine tower and drive system.
   3. Wind turbine drive system.
   4. Wind turbine controllers.
   5. Monitoring system.

B. Capacity: 20kW.

C. Maximum height to the top of the complete wind turbine system: 105 ft (32m)

D. Provide wind energy system and associated components suitable for wind loads, snow loads, seismic loads, and other structural design considerations of the installed location.

E. Provide wind energy system and associated components suitable for continuous operation under the service conditions at the installed location.

F. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) as suitable for the purpose indicated.

G. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system.

H. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

2.03 WIND TURBINE

A. General Requirements:
   1. Design class: IEC SWT CLAS II (up to 50kW).
   2. Design standard: IEC 61400-2.
   3. Minimum rated speed: 24.6 mph (11.0m/s).
   4. Maximum cut in speed: 5.5 mph (2.7m/s).
   5. Minimum cut out speed: 55.9 mph (25m/s).

B. Environmental Requirements
   1. Minimum survivable wind: 132 mph (59m/s).
   2. Temperature Range: -13℉ to 122℉ (-25℃ to 50℃) .

C. Component Requirements:
   1. Blades:
      a. Quantity: 3.
      b. Material: Fiberglass.
   2. Brakes:
      a. Pneumatic disk brakes.
      b. Electric solenoid valve shall failsafe to the ON position (brakes applied).
      c. Compressor: NEMA 3R rated at the base of the tower.
   3. Generator: 20kW, 3 Phase, Permanent Magnet.
   4. Wind sensor: Heated, ultrasonic sensor. Measures wind speed and direction. Mounted at top of nacelle.
   5. Yaw system:
      a. Automatic operation from PLC based on wind speed and direction data from the wind sensor.
      b. Rotates nacelle into or out of wind direction to maintain rated energy output.

2.04 WIND TURBINE TOWER AND FOUNDATION

A. Basis of Design: 70 ft (21.3m)

B. Monopole tower constructed from tubular steel in a maximum of two sections.

C. Tower height: As tall as possible without exceeding the maximum structure height with the given wind turbine rotor diameter.

D. Foundation: The foundation requirements are based on the wind turbine and tower basis of design equipment and are to be revised per the selected turbine and tower structure equipment at no additional expense to the owner.

E. Concrete and rebar: See Section 03 3000 - Cast-in place concrete.

F. Grounding and bonding: See Section 26 0526 - Grounding and bonding of electrical systems.

2.05 WIND TURBINE DRIVE SYSTEM

A. General Requirements:
   1. Converts the wind turbine power output to 3 phase, 480V, 60 Hz power.
   2. Maximum output current: 27 Amps.
   3. Condition the output to reduce power anomalies such as harmonics equal to or better than the basis of design.
   4. Resistive braking: Under power failure stop the turbine in less than 6 seconds regardless of wind speed.
   5. Protect the utility interconnection in conformance with UL 1741:

a. Provide over and under voltage protection (ANSI 27 and 59).
b. Provide over and under frequency protection (ANSI 81).
c. Synchronize the utility and wind turbine regenerative power supply outputs before connecting.
d. Provide anti-islanding protection.
e. Receive a NO contact signal from the automatic transfer switch and expand the ANSI 27, 59, and 81 tolerances. The signal shall indicate that the transfer switch has been connected to emergency power from the generator. The expanded tolerances will allow for common voltage and frequency fluctuations when interconnecting with a 130kW generator source.
f. Installed in lockable NEMA 3R enclosure and mounted at the base of the wind turbine. Provide adequate heating and ventilation to meet the environmental while maintaining NEMA 3R rating to meet the same environmental temperature specifications as the wind turbine.

B. Drive System Components - Basis of Design:
1. Grid Safety Relay: SEL-547.
2. Electric Drive System:
a. a. Bosch Rexroth AG, IndraDrive M Series.
b. b. Main filter, choke, brake resistor, and motor filter designed around the HMV01.1R-W0045 regenerative power supply.

2.06 WIND TURBINE CONTROLLER AND MONITORING SYSTEM

A. Programmable Logic Controller Requirements:
1. NEMA 4 rated lockable enclosure with viewing window.
2. Mounted at the base of the wind turbine.
3. Power supplies protected by auto-reset circuit breakers.
4. Provides automatic control of the regenerative power supply, yaw system, heating & cooling in the Nacelle and drive system enclosure, and braking.
5. Digital display screen interface:
a. Password protected.
b. Displays information from the monitoring system (metered data, alarms)
6. Provide manual override controls:
a. Enable/Disable automatic wind turbine operation.
b. Enable/Disable the parking brake.
c. Emergency stop.
d. Manual control of the yaw motor.
7. Ethernet Connection:
a. Browser interface for remote access to the controller.
b. Password protected connection.
c. Able to retrieve all metered data and active alarms from the monitoring system.
d. Provides ability to emergency stop the turbine.

B. Monitoring System Requirements:
1. Monitor the following sensors:
a. Power consumed.
b. Power output.
c. Wind speed.
d. Wind direction.
e. Turbine RPM.
f. Nacelle temperature.
g. Drive system enclosure temperature.
h. Yaw position.
2. Meter the following data:

a. Power consumed.
b. Power output.
c. Wind speed.
d. Wind direction.

3. Provide the following alarms:
   a. Emergency stop.
   b. Turbine turned off.
   c. Yaw correction timed out.
   d. Vibration sensor fault.
   e. Communication failure to the Nacelle.
   f. Yaw proximity sensor fault.
   g. Wind sensor fault.
   h. Generator is overheating.
   i. Generator has overheated.
   j. Wind is above the cut-out limit.
   k. Park brake on.
   l. Temperature limit fault (Drive system enclosure, nacelle).
   m. Controller faults (short circuit, memory, power).
   n. Drive system communication fault.
   o. Inverter fault.
   p. Ethernet connection failed.
   q. Resistive brake module fault.
   r. Turbine maintenance pending.
   s. Turbine remote shutdown active.
   t. Yaw overload trip.
   u. Grid safety fault.
   v. Drive system fault.
   w. Positive torque limit exceeded.
   x. Brake monitor fault.

2.07 SOURCE QUALITY CONTROL

A. Factory test the following products to verify operation and performance characteristics. Include test reports with submittals.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that ratings and configurations of system components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive system components.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1.

B. Install products in accordance with manufacturer's instructions.

C. Mount equipment such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor, ground, or working platform.

D. Foundation & Tower:
   1. Install foundations plumb.

2. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
3. Tighten anchor bolt nuts to manufacturer's recommended torque.

E. Identification Requirements, in Addition to Those Specified in Section 26 0553:
1. Use identification nameplate or means of identification acceptable to authority having jurisdiction to identify the presence of multiple power sources and the location of main service disconnecting means and each photovoltaic system disconnecting means. Locate at main service disconnecting means and each photovoltaic system disconnecting means. Verify format and descriptions with authority having jurisdiction.
2. Use identification nameplate or identification label to identify each photovoltaic system DC disconnecting means with the following information:
   a. Rated maximum power-point current (operating current).
   b. Rated maximum power-point voltage (operating voltage).
   c. Maximum system voltage.
   d. Short-circuit current.
   e. Maximum rated output current of the charge controller (if installed).
   f. Use identification nameplate or identification label to identify the interactive system point of interconnection at the disconnecting means as a power source and with the rated AC output current and the nominal operating AC voltage.
   g. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for photovoltaic system disconnecting means. Include the word message "Warning - Electric Shock Hazard; Do not touch terminals; Terminals on both the line and load sides may be energized in the open position" or approved equivalent.
   h. Use wire and cable markers to identify photovoltaic system source, output, and inverter circuit conductors at all points of termination, connection, and splices.
   i. Use voltage markers, identification labels, stenciled text, or suitable permanent marking approved by authority having jurisdiction to identify exposed raceways, cable trays, pull boxes, junction boxes, and conduit bodies with the text "Wind Turbine Power Source" at maximum intervals of 10 feet (3 m) in accordance with NFPA 70.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. See article "SYSTEM STARTUP" below for additional requirements related to testing and inspection.

C. Provide services of a manufacturer's authorized representative to observe installation and assist in inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.

D. Inspection and testing to include, at a minimum:
1. Inspect each system component for damage and defects.
2. Verify that equipment enclosures, boxes, and associated connections installed outdoors are weatherproof.
3. Verify proper wiring connections have been made and check for conductor continuity. Verify proper polarity.
4. Verify tightness of mechanical and electrical connections are according to manufacturer's recommended torque settings.
5. Measure and record voltages at the inverter AC and DC inputs.
6. Measure and record AC output power.
7. Perform inverter functional test.

E. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.04 SYSTEM STARTUP

A. Provide services of a manufacturer's authorized representative to assist in performing system startup. Include manufacturer's detailed startup procedures with submittals.

B. Obtain owner's approval prior to performing system startup.

C. Grid-Tied Systems: Assist Owner in obtaining Utility Company's approval prior to performing system startup.

D. Prepare and start system in accordance with manufacturer's instructions.

3.05 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of system to owner's personal, and correct deficiencies or make adjustments as directed.

B. Training: Train owner's personnel on operation, adjustment, and maintenance of wind energy system.

1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

END OF SECTION

SECTION 27 1005

STRUCTURED CABLING SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Telecommunication Horizontal distribution.

B. Cabling and pathways inside/outside building(s).

C. Distribution frames, cross-connection equipment, enclosures, and outlets.

D. Grounding and bonding the telecommunications distribution system.

1.02 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. TIA/EIA-568-B.1 - Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements; Rev B, 2001; Addenda 1-7.

C. TIA-569 - Commercial Building Standard for Telecommunications Pathways and Spaces; 2009.

D. ANSI/J-STD-607 - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications; Rev A, 2002.

E. UL 444 - Communications Cables; Current Edition, Including All Revisions.

F. UL 497 - Standard for Protectors for Paired-Conductor Communications Circuits; Current Edition, Including All Revisions.

G. UL 1863 - Standard for Communications-Circuit Accessories; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Storage and handling requirements and recommendations.
   2. Installation methods.

B. Manufacturer Qualifications.

C. Installer Qualifications.

D. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing, and intended test date; submit at least 60 days prior to intended test date.

E. Field Test Reports.

F. Project Record Documents:
   1. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.

G. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of project record documents.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.

B. Installer Qualifications: A company having at least 5 years experience in the installation and testing of the type of system specified, and:
   1. Supervisors and installers factory certified by manufacturers of products to be installed. Installer must meet Manufacturer's requirements to provide Warranty identified below.
   2. Employing BICSI Registered Cabling Installation Technicians (RCIT) for all work.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Keep stored products clean and dry.

1.06 WARRANTY

A. Provide minimum 10 year Extended Warranty to cover the repair or replacement of any product provided by the manufacturer that fails to meet the published specifications.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

A. Provide a complete permanent system of cabling and pathways for telecommunications, including cables, conduits and wireways, pull wires, support structures, enclosures, and outlets.
   1. Comply with TIA/EIA-568 and TIA/EIA-569, latest editions.
   2. Provide fixed cables and pathways that comply with NFPA 70 and ANSI/J-STD-607 and are UL listed or third party independent testing laboratory certified.

2.02 PATHWAYS

A. Conduit: As specified in Section 26 0534; provide pull cords in all conduit.

2.03 COPPER CABLE AND TERMINATIONS

A. Copper Horizontal Cable: TIA/EIA-568 Category 6 solid conductor unshielded twisted pair (UTP), 24 AWG, 100 ohm; 4 individually twisted pairs; complying with all relevant parts of and addenda to latest edition of TIA/EIA-568 and UL 444.
   1. Testing: Furnish factory reel tests.

B. Jacks and Connectors: Modular RJ-45, keystone, terminated with 110-style insulation displacement connectors; high impact thermoplastic housing; complying with same standard as specified horizontal cable and UL 1863.
   1. Performance: 500 mating cycles.
   2. 4-pair, Compatible with T568A/B wiring schemes.
   3. Capable of simultaneously terminating cable using single position 4-pair termination tool.
   4. Color as identified under System Design above.

2.04 FIBER OPTIC CABLE AND CONNECTORS

A. Fiber Optic Cable: Strand count as identified on Drawings, multimode 62.5/125 um, complying with TIA-492AAAA; covered with single plenum rated jacket and complying with relevant portions of and addenda to latest edition of TIA/EIA-568.

B. Fiber Optic Adapters and Connectors: ST; complying with relevant parts and addenda to latest edition of TIA/EIA-568 and with maximum attenuation of 0.25 dB at 1300 nm with less than 0.2 dB change after 500 mating cycles when tested in accordance with TIA-455-21.

2.05 CROSS-CONNECTION EQUIPMENT

A. Ethernet Copper to Fiber Media Converter: Transition Networks SSETF1011-205 or equal.

2.06 ENCLOSURES

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with latest editions and addenda of TIA/EIA-568, TIA/EIA-569, ANSI/J-STD-607, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

3.02 PATHWAYS

A. Install with the following minimum clearances:
   1. 48 inches (1220 mm) from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
   2. 12 inches (300 mm) from power conduits and cables and panelboards.
   3. 5 inches (125 mm) from fluorescent and high frequency lighting fixtures.
   4. 6 inches (150 mm) from flues, hot water pipes, and steam pipes.

B. Conduit:
   1. Do not install more than 2 (two) 90 degree bends in a single horizontal cable run.
   2. Leave pull cords in place where cables are not initially installed.
   3. Conduit fill shall not exceed 60%. Each conduit end shall be equipped with a protective insulator or sleeve to cover the conduit end, connection nut or clamp, to protect the wire or cable during installation and remaining in the conduit. AC power conduit shall be run separate from signal conduit.
   4. Conceal conduit under floor slabs and within finished walls, ceilings, and floors except where specifically indicated to be exposed.
      a. Conduit may remain exposed to view in mechanical rooms, electrical rooms, and telecommunications rooms.
      b. Where exposed to view, install parallel with or at right angles to ceilings, walls, and structural members.

C. Grounding and Bonding: Perform in accordance with ANSI/J-STD-607 and NFPA 70.

D. Firestopping: Seal openings around pathway penetrations through fire-rated walls, partitions, floors, and ceilings in accordance with Section 07 8400.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

A. Cabling:
   1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
   2. Do not over-cinch or crush cables.
   3. Do not exceed manufacturer's recommended cable pull tension.
   4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.

B. Copper Cabling:
   1. Category 6: Maintain cable geometry; do not untwist more than 1/2 inch (12 mm) from point of termination.
   2. For 4-pair cables in conduit, do not exceed 25 pounds (110 N) pull tension.
   3. Provide Building Entrance Primary Surge Protector for all copper cables identified on Drawings at each building entrance.
   4. Ground Primary Surge Protector to Telecom Rm. Grounding Bus Bar with minimum #6 AWG wire.

3.04 FIELD QUALITY CONTROL

A. Comply with inspection and testing requirements of specified installation standards.

B. Visual Inspection:

1. Inspect cable jackets for certification markings.
2. Inspect cable terminations for color coded labels of proper type.
3. Inspect outlet plates and patch panels for complete labels.

C. Testing - Copper Cabling and Associated Equipment:
   1. Provide electronic copy of test report for approval by Engineer.
   2. The systems' cables shall be fully tested and certified to TIA/EIA568-B.2-10 Cat. 5e Standards. Test shall include the following: wire map, length, insertion loss, return loss, NEXT, PSNEXT, ELFEXT, PSELFEXT, propagation delay and delay skew.

D. Testing - Fiber Optic Cabling
   1. Perform optical fiber end-to-end attenuation test using an optical time domain reflectometer (OTDR) and optical power meter; perform verification acceptance tests and factory reel tests.
   2. Each fiber strand link shall be in compliance with the following test limits:
      a. Optical loss testing: Multimode and Singlemode links.
   3. The link attenuation shall be calculated by the following formulas as specified in ANSI/TIA-568-C.0.
      a. Link Attenuation (dB) = Cable Attn (dB) + Connector Attn (dB) + Splice Attn (dB)
      b. Cable Attn (dB) = Attenuation Coefficient (dB/km) * Length (Km)
      c. Connector Attn (dB) = number of connector pairs * connector loss (dB)
      d. Maximum allowable splice loss = 0.5 dB
      e. Splice Attn (dB) = number of splices * splice loss (dB)
      f. Maximum allowable splice loss = 0.3 dB
   4. Test Parameters for Type of Optical Fiber
      a. Attenuation coefficient (dB/km) @ Wavelength (nm)
         1) Singlemode: .4 dB/km @ 1310 nm
         2) Singlemode: .3 dB/km @ 1550 nm
      b. Attenuation coefficient (dB/km) @ Wavelength (nm)
         1) Multimode: 3 dB/km @ 850 nm
         2) Multimode: 1 dB/km @ 1300 nm
   5. OTDR testing
      a. Reflective events (connections) shall not exceed 0.5 dB.
      b. Non-reflective events (splices) shall not exceed 0.3 dB.
   6. Provide electronic copy of test report for approval by Engineer.
   7. Links: Perform optical fiber end-to-end attenuation tests and field reel tests.

END OF SECTION

SECTION 31 2316
TRENCHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Excavating trenches for secondary electrical conduits.
B. Backfilling and compacting.
C. Restoration of surfaces.

1.02 DEFINITIONS

A. Utility: Any buried pipe, conduit, or cable.

B. Primary electrical conduits: Conduits serving 15kV conductors from utility pole, switches, transformers and other such devices.

C. Fiber Optic cable conduits: Conduits serving fiber optic cabling.

D. Secondary electrical conduits: Conduits serving service entrance conductors from transformers into building main distribution panels.

1.03 SUBMITTALS FOR INFORMATION

A. Section 01 1400 - Submittals: Procedures for submittals.

B. Design Data and Calculations: Include calculations for each exterior conduit support concrete grade beam varying from Table III; certified by Engineer registered in Iowa.

1.04 SUBMITTALS AT PROJECT CLOSEOUT

A. Section 01 1400 - Contract Closeout: Procedures for documents maintenance and submittals.

B. Project Record Documents:
1. Maintain documents at site during construction and submit at Contract Closeout.
2. Record location and depth of all conduits installed in trenches and transcribe on as-built drawings.

1.05 SUBSURFACE CONDITIONS

A. When unexpected subsurface conditions are encountered, discontinue work in affected area and consult with Architect/Engineer. Contract Price will be adjusted for corrective measures.

PART 2 - PRODUCTS

2.01 BED AND FILL MATERIALS

A. Soil Materials:
1. Select Fill Earth (Type S2):
   a. Cohesive material; minimum ASTM D2487 Group Symbol CL rating.
   b. Free of lumps larger than 3 inches (75 mm), rocks larger than 2 inches (50 mm), vegetable matter, rubbish, or other unstable material.
   c. Suitable for compaction as scheduled.
2. On-Site Topsoil (Type S3):
   a. Stockpiled on site.
   b. Free of roots, rocks larger than 1/2 inch (13 mm), subsoil, debris, large weeds and foreign matter.
3. Imported Topsoil (Type S4):
   a. Fertile, friable loam, capable of sustaining vigorous plant growth, from well drained site free from flooding, not in frozen or muddy condition.

B. Aggregate Materials:
   1. Porous Fill:
      a. Crushed Stone (Type A1): 1/4 to 3/4 inch (6 to 19 mm) size; reasonably free of fines, particularly clay; graded in accordance with ASTM C136 and Table I.

Sieve Size	Percent Passing
3/4 inch (19 mm)	100
1/2 inch (12.5 mm)	95 to 100
3/8 inch (9.5 mm)	50 to 100
No. 4 (4.75 mm)	15 to 50
No. 8 (2.36 mm)	0 to 8

      b. Pea Gravel (Type A2): Clean, smooth, rounded, 3/8 to 3/4 inch (9.5 to 19 mm) size, uniformly graded; graded in accordance with ASTM C136.
      c. Gravel (Type A3): ASTM D2487 Group Symbol GW; angular pit run crushed natural stone; free from rocks over 2 inch (50 mm) size, shale, clay, friable materials, and debris.
   2. Granular Fill (Type A4):

Sieve Size	Percent Passing
3/8 inch (9.5 mm)	100
No. 4 (4.75 mm)	90 to 100
No. 8 (2.36 mm)	70 to 100
No. 200 (75 Φm)	0 to 1.5

      a. Clean natural river or bank sand.
      b. Free from silt, clay, loam, friable or soluble materials, and organic matter.
      c. ASTM D2487 Group Symbol SW.
      d. Suitable for control compaction as scheduled.
      e. Graded in accordance with ASTM C136 and Table II.

C. Concrete: Lean concrete Structural concrete, as specified in Section 03 3000, with minimum compressive strength of 3000 psi (21 MPa).

D. Concrete Bedding: ASTM C94, minimum 2,000 psi design strength or "K-Krete".

2.02 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable water permeable fabric that will retain sand.

PART 3 - EXECUTION

3.01 EXAMINATION AND PROTECTION

A. Section 01 1400 - Coordination, Procedures, and Meetings: Verification of site conditions.

B. Verify fill materials to be reused are acceptable.

C. Identify and flag known utility locations.
   1. Coordinate with utility companies prior to excavating near utility's lines.
   2. Coordinate with Owner prior to excavating near Owner utilities.
   3. Verify actual utility location and depth with hydro-vac type equipment.
   4. Document exact location and depth on as-built drawings.

D. Coordinate with Iowa One-Call at least five days prior to commencement of directional boring.

E. Identify and flag known tunnel locations. Verify depth.

F. Flag color schemes:
   1. Electric: Red.
   2. Gas-Oil-Steam: Yellow.
   3. Communication-Alarm-Signal-CATV: Orange.
   4. Water: Blue.
   5. Sewer-Drain: Green.
   6. Irrigation: Purple.
   7. Temporary Survey Markings: Pink.
   8. Proposed Excavation: White.

G. Maintain and protect existing utilities which pass through Work area.

H. Protect plant life, lawns, rock outcroppings, and other features remaining as portion of final landscaping.

I. Protect survey bench marks, existing structures, fences, sidewalks, paving, and curbs from earth working equipment and vehicular traffic.

J. Repair damage by Contractor to include filling/leveling of ruts, and other soils damage. Owner to re-seed/re-sod damaged lawn.

K. Take measures to minimize damage when maneuvering equipment on lawns.

L. Notify Owner's Representative and Architect/Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

3.02 PREPARATION

A. Underpin or otherwise support adjacent structures which may be damaged by excavation work. Include service lines and pipe chases.

B. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with bedding material and compact to density equal to or greater than requirements for bedding.

C. Protect excavations from cave-in and from loose earth falling into excavations.

D. Protect bottom of excavations and soil around and beneath foundations from frost.

E. Divert surface drainage and dewater trenches; keep trenches free of water.

3.03 EXCAVATION

A. Excavate subsoil required for installation of secondary conduits. Use horizontial directional boring method to install secondary conduits under existing concrete drives parking areas. Coordinate requirements with Owner.

B. Excavate trenches to proper depth and accurate gradient. Trim and leave free of loose matter.

C. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.

D. Excavation cut not to interfere with bearing splay of foundation.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. When necessary to excavate through roots, perform work by hand and cut roots with a sharp axe. Do not disturb soil within branch spread of trees or shrubs to remain.

G. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd (0.25 cu m), measured by volume. When larger material is encountered, consult with Architect/Engineer. Contract Sum will be adjusted to cover documented unforeseeable additional cost.

H. Correct areas over excavated to match original conditions.

I. Stockpile excavated material on site in locations directed by Owner.

3.04 BEDDING AND STRUCTURAL SUPPORTS

A. Provide firm foundation of uniform density throughout entire length of conduit:
   1. Use porous fill, Type A2 or granular fill, Type A4, for metal conduit.
   2. Use granular fill, Type A4, for PVC conduit.
   3. Provide depressions for conduit bells.

B. Remove wet or unstable soil and replace with porous fill or concrete bedding.

C. Provide reinforced concrete grade beams across backfill at structure walls and other locations subject to shear. Ensure grade beams adequate for support of underground piping, tunnels, and conduits, and their overburden. Coordinate changes required from beam locations shown on Drawings. Provide beam in accordance with Table III for each condition. Refer to Section 03 3000 for concrete materials.

3.05 BACKFILLING

A. Verify testing of conduit has been completed and structure penetrations have been waterproofed.

B. Remove cribbing, rocks, and debris from trenches.

C. Backfill to minimum one foot above conduit as soon as practicable; prevent disturbance of conduit.

D. Place and compact backfill in continuous layers not exceeding 6 inches loose depth.

E. Compact granular fill, Type A4, to 70 percent of materials relative density, ANSI/ASTM D4253 and D4254; earth under floor or paving to 95 percent of optimum, ANSI/ASTM D698.

F. Compact subsoil fill to 80 percent of optimum, ANSI/ASTM D698.

G. Maintain backfill materials free of frost and frozen materials and at optimum moisture content to attain required compaction density.

H. Remove surplus backfill materials from site. Deposit in location elsewhere on site as directed by Owner.

I. Repair or replace piping, conduit and wiring, or cable damaged or misaligned during backfilling operations.

J. Correct noticeable settlement for minimum period of two years.

3.06 TOLERANCES

A. Top Surface of Backfilling: Plus or minus 0.1 foot (30 mm) from required elevations.

3.07 RESTORATION OF SURFACES

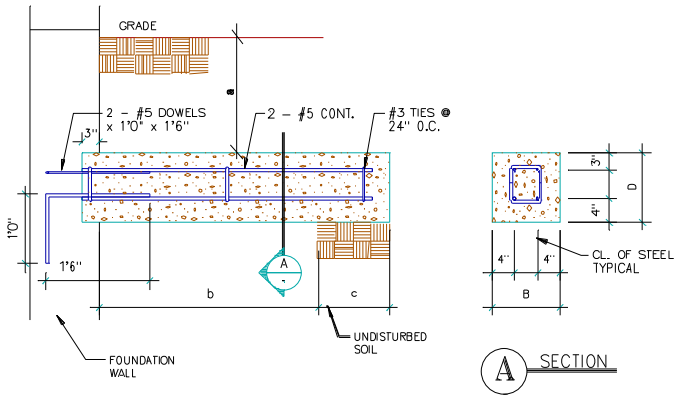
A. Replace surfaces, cut or otherwise disturbed by trenching and backfilling.

B. Duplicate original surfacing; match condition, appearance and wearing value of original surfacing.

C. At existing lawn areas, place topsoil for re-seeding/re-sodding by Owner. Provide minimum 12 inches clean topsoil without tamping and rake free of clods. Allow 2 inches for settlement.

3.08 BACKFILL SCHEDULE

A. Around Conduit: Granular Fill (Type A4), to minimum 6 inches above pipe or conduit.



a	b	BEAM SIZE B	BEAM SIZE D	BOTTOM BARS	C	REMARKS
10'-0"	8'-0"	12"	12"	2 C #5	2'-0"	
10'-0"	10'-0'	12"	12"	2 C #6	2'-4"	
10'-0"	12'-0"	12"	14"	3 C #5	2'-8"	
10'-0"	14'-0"	12"	14"	3 C #6	3'-2"	
15'-0"	8'-0"	12"	12"	3 C #5	2'-8"	
15'-0"	10'-0"	12"	14"	2 C #7	3'-4"	
15'-0"	12'-0"	12"	16"	2 C #8	4'-0"	
15'-0"	14'-0"	12"	16"	3 C #7	4'-8"	
20'-0"	8'-0"	12"	12"	4 C #5	3'-6"	
20'-0"	10'-0"	12"	16"	2 C #8	4'-6"	
20'-0"	12'-0"	12"	16"	2 C #9	5'-4"	
20'-0"	14'-0"	12"	18"	3 C #8	6'-0"	

B. Under Interior Slab On Grade Floors Without Underdrains: Granular Fill (Type A4).

C. At Interior Slab On Grade Floors With Underdrains: Replace underdrain system materials; Type A4 granular fill (sand) not permitted in underdrain system porous fill.

D. Under Exterior Slab On Grade and Bituminous Paving: Continue to subgrade with granular fill (Type A4), or select fill earth (Type S2).

E. At Lawn and Landscape Areas: Continue with subsoil, to 12 inches below finish grade.

END OF SECTION

SECTION 31 2317
HORIZONTAL DIRECTIONAL BORING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Horizontal Directional Boring for electrical conduits, fiber optic cable conduits and control circuit conduits installed under existing paving.
B. Excavation and restoration of entry and exit pits.
C. Conduit installation.
D. Plotting of bore path.

1.02 DEFINITIONS

A. Utility: Any buried pipe, conduit, or cable.

B. Electrical conduits: Conduits serving power conductors from utility pole, switches, transformers and other such devices.

C. Fiber Optic cable conduits: Conduits serving fiber optic cabling.

D. Control circuit conduits: Conduits serving control wires and cables.

1.03 SUBMITTALS AT PROJECT CLOSEOUT

A. Section 01 1400 - Contract Closeout: Procedures for documents maintenance and submittals.

B. Project Record Documents:
1. Maintain documents at site during construction and submit at Contract Closeout.
2. Record/verify locations of all located utilities and record depths of exposed utilities.
3. Record location and depth of all borings and transcribe on record drawings.

1.04 QUALIFICATIONS

A. Installer: Company specializing in horizontal directional boring with:
1. Documented experience of successful installation of at least 20,000 lineal feet of conduit by this method.
2. Certificates documenting operators have completed a certified class in utility locating.
3. Certificates documenting operators have completed factory training on the boring model to be used for this project.

1.05 SUBSURFACE CONDITIONS

A. When unexpected subsurface conditions are encountered, discontinue work in affected area and consult with Architect/Engineer. Contract Price will be adjusted for corrective measures.

PART 2 - **PRODUCTS (not used)**

PART 3 - **EXECUTION**

3.01 EXAMINATION AND PROTECTION

A. Section 01 1400 - Coordination, Procedures, and Meetings: Verification of site conditions.

B. Identify and flag known utility locations.
1. Coordinate with utility companies prior to excavating near utility's lines.
2. Coordinate with Owner prior to excavating near Owner utilities.
3. Verify actual utility location and depth with hydro-vac type equipment.
4. Document exact location and depth on as-built drawings.

C. Coordinate with Iowa One-Call and Owner at least five days prior to commencement of directional boring.

D. Identify and flag known tunnel locations. Verify depth.

E. Flag color schemes:
1. Electric: Red.
2. Gas-Oil-Steam: Yellow.
3. Communication-Alarm-Signal-CATV: Orange.
4. Water: Blue.
5. Sewer-Drain: Green.
6. Irrigation: Purple.
7. Temporary Survey Markings: Pink.
8. Proposed Excavation: White.

F. Maintain and protect existing utilities which pass through Work area.

G. Protect plant life, lawns, rock outcroppings, and other features remaining as portion of final landscaping.

H. Protect survey bench marks, existing structures, fences, sidewalks, paving, and curbs from earth working equipment and vehicular traffic.

I. Repair damage by Contractor to include filling/leveling of ruts and other soils damage. Owner to re-seed/re-sod damaged lawn.

J. Take measures to minimize damage when maneuvering equipment on lawns.

K. Notify Owner's Representative and Architect/Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

3.02 PREPARATION

A. Protect bottom of excavations and soil around and beneath foundations from frost.

B. Divert surface drainage and dewater entry and exit pits. Keep pits free of water.

3.03 EXCAVATION

A. Flag bore path prior to boring. Correct flagging during bore if borepath deviates from planned route. Mark depth with permanent marker on flags.

B. Calibrate drillhead monitor/locator prior to boring.

C. Verify transmitter batteries are fully charged.

D. Determine required drilling mixture and cutting bit head for on-site soil conditions.

E. Where depth of other utility is in question, expose utility to verify.

F. Use mechanical with fluid-assist boring equipment. Fluid cutting only not allowed.

G. Monitor and record measurements on as-built drawings while drilling.

3.04 CONDUIT INSTALLATION

A. Refer to Section 26 0534 - Conduits for product information.

B. Protect conduit and joints from injury and damage during storage and installation.

C. Replace sections of pipe showing evidence of deformation, gouging, defects, cracks, or stress discoloration.

D. Seal ends of conduit immediately after installation.

3.05 BACKFILLING

A. Remove all mud and drilling mixture from entry and exit pits.

B. Place and compact backfill in continuous layers not exceeding 6 inches loose depth.

C. Compact subsoil fill, to 80 percent of optimum, ANSI/ASTM D698.

D. Maintain backfill materials free of frost and frozen materials and at optimum moisture content to attain required compaction density.

E. Remove surplus backfill materials from area and store as directed by Owner.

F. Repair or replace conduit damaged or misaligned during backfilling operations.

G. Correct noticeable settlement for minimum period of one year.

3.06 RESTORATION OF SURFACES

A. Replace surfaces, cut or otherwise disturbed at entry and exit pits.

B. Duplicate original surfacing; match condition, appearance and wearing value of original surfacing. Owner will re-seed/re-sod lawn areas.

C. At existing lawn areas, place topsoil for re-seeding/re-sodding by Owner. Provide minimum 12 inches clean topsoil without tamping and rake free of clods. Allow 2 inches for settlement.

END OF SECTION

(Vendor may copy as needed)

Due on or Before May 30, 2012, 1:00 P.M.

If Required Email At Once

Letting Date: June 6, 2012 1:00 P.M.

If Required Email At Once

Iowa Department of Transportation
Bidders Request for Exceptions or Equal
Proposal No.: LT00991

Item: Rockwell City Wind Turbine

Spec. No. _____

Bid Proposal Requests:_____

_____

_____

Bidder Proposes to furnish in lieu of above:_____

_____

_____

_____

Mail/Fax to:

Iowa Department of Transportation
Attention: Mary Zimmerman
Purchasing Section
800 Lincoln Way
Ames, Iowa 50010
Phone No. 515-239-1298
Fax No. 515-239-1538
Mary.zimmerman@dot.iowa.gov

By_____

Company_____

Address _____

_____
City State Zip Code

Phone No._____

Fax No. _____

==========

DOT USE ONLY

Approved_____ Disapproved_____

Reason_____

_____

Signature:_____Date:_____

Form 131084wd
12-11

Iowa Department of Transportation

PROPOSAL GUARANTY / BID BOND

KNOW ALL PERSONS BY THESE PRESENTS: That we, _____
(Contractor's/Bidder's Name)

_____ of _____
(City,State)

as principal, and the _____
(Surety)

of _____ as Surety, are held and firmly bound unto the Iowa Department of
(Address)

Transportation and to the State of Iowa, or Municipality as defined in Iowa Code, Section 73A.1 as applicable, hereinafter defined as Obligee, in the penal sum as shown in the contract documents of the specified project, for which payment said principal and surety bind themselves, their heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents.

WHEREAS, the principal is herewith submitting his/her or its sealed proposal for:

County _____ Bid Order # _____
(not required by Purchasing Section)

Type of Work _____

Date of Letting _____ , 20 _____ .

NOW THEREFORE, if the said proposal bid by said principal be accepted, and the principal shall enter into a contract with the Obligee in accordance with the terms of such bid, and give such bond as may be specified in the bidding or contract documents with good and sufficient surety for the faithful performance of such contract and for the prompt payment of labor and material furnished in the prosecution thereof, then this obligation shall become null and void or in the event of the failure of the principal to enter such contract and give such bond, the principal shall pay to the Obligee the full amount of the bid bond, together with court costs, attorney's fees, and any other expense of recovery.

IN WITNESS WHEREOF, the principal and surety have caused these presents to be signed this _____ day of

_____ , 20 _____ .

_____
Principal
(Contractor's/Bidder's Name)

By _____
Contractor's/Bidder's Signature

_____
Address

_____
Surety

By _____
Authorized Surety Representative